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PROTECTING OUR NATION'S GROUNDWATER: THE NEED FOR BETTER PROGRAM COORDINATION

HEARINGS

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT EFFICIENCY, FEDERALISM, AND THE DISTRICT OF COLUMBIA

OF THE

COMMITTEE ON
GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

SECOND SESSION

ON

S. 1992

TO PROMOTE INTERGOVERNMENTAL AND INTERAGENCY COOPERATION ON GROUNDWATER MANAGEMENT AND PROTECTION AND TO FACILITATE THE DISSEMINATION OF PRACTICAL INFORMATION ON GROUNDWATER PROTECTION TO THE PUBLIC

APRIL 22 AND MAY 18, 1988

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PROTECTING OUR NATION'S GROUNDWATER: THE NEED FOR BETTER PROGRAM COORDINATION

FRIDAY, APRIL 22, 1988

U.S. SENATE,
SUBCOMMITTEE ON GOVERNMENT EFFICIENCY,
FEDERALISM, AND THE DISTRICT OF COLUMBIA,
COMMITTEE ON GOVERNMENTAL AFFAIRS,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:10 a.m. in room 428A, Russell Senate Office Building, Hon. James R. Sasser, Chairman of the Subcommittee, presiding.

Present: Senators Sasser and Heinz.

OPENING STATEMENT OF SENATOR SASSER

Senator SASSER. The Subcommittee on Government Efficiency, Federalism and the District of Columbia is now called to order.

Good morning. I am pleased today to chair this hearing on the Nation's groundwater management problem, including S. 1992, a bill offered by myself and the distinguished ranking member of this Subcommittee, Senator Heinz of Pennsylvania, and the principal cosponsors, Senator Roth of Delaware and Senator Riegle of Michigan.

In this hearing, we will be taking testimony from witnesses who are experts in, and in most cases, in charge of their State's groundwater management programs. These witnesses come from the States of Tennessee, Pennsylvania, and Delaware. In addition, we will hear from two interstate organizations that are concerned with groundwater. These witnesses are from Utah and Nebraska, but appear today as representatives of the Western States Water Council and the Interstate Conference on Water Policy.

In a second hearing some three weeks from today, the Subcommittee will be taking testimony from the Environmental Protection Agency, the U.S. Geological Survey, the American Mining Congress, the American Farm Bureau, the Chemical Manufacturers Association, one of the foremost national groundwater consulting firms, and two national environmental groups.

Now, today the Subcommittee will hear from those individuals who work down where the rubber meets the road, so to speak, in dealing with the problems of the Nation's groundwater. They will discuss what assistance they are receiving from the Federal Government and what assistance they need in order to undertake effective and efficient groundwater management practices.

Groundwater is a tremendously important national resource. It is one of those resources for which there is absolutely no substitute. All life as we know it needs two things—air and water—to exist on this Earth. Groundwater supplies one-fourth of the Nation's population with drinking water. It is the source of virtually all of the drinking water for rural areas of this country and it is used for forty percent of our irrigation needs.

Now, fortunately, groundwater is in abundant supply. It constitutes ninety-six percent of the world's total water resources. Our Nation alone has over fifteen quadrillion gallons stored a half-mile under the surface. This is equal to thirty-five years worth of surface run-off or four hundred times our annual usage of water. But once contaminated, groundwater is virtually impossible to clean without enormous expenditures of both money and effort.

All of our fifty States have some degree of groundwater contamination already. We know, from an abundance of scientific research, that we cannot pour out our wastes on the ground or bury them and depend entirely on the soil to filter out the impurities in these wastes before they reach our groundwater supply. We know that groundwater contamination can cause cancer. It can cause liver, kidney and nerve damage. Groundwater pollution also kills scarce natural resources, such as fish, wildlife and vegetation.

The Federal response to this problem has evolved over time and is not clearly focused. There are more than sixteen major pieces of Federal legislation that concern groundwater in one way or another. Moreover, the responsibility for managing groundwater has been spread across more than two dozen Federal agencies and offices.

Now that the Nation's consciousness has been raised about groundwater problems, we should understand that this ad hoc approach that is now being taken is neither the most efficient nor effective means of dealing with these issues. As the Office of Technology Assessment said in its major publication on the Nation's groundwater and I quote, "Effective implementation of groundwater programs will require the coordination of activities among and within agencies."

The report went on to state that: "The level of Federal support to the States is not adequate nor is it directed to all of the State's problems. In some cases, current Federal laws and programs have created problems. The lack of an explicit national legislative goal to protect groundwater quality has led to uncoordinated Federal programs and has handicapped the States in obtaining authority to address certain problems."

This Subcommittee today, and in future hearings, will be seeking to participate in the reformulation of an omnibus groundwater management program under the auspices of its Government efficiency and federalism jurisdiction. I think this is especially appropriate since we need a coherent and coordinated Federal/State management of our groundwater pollution problems.

I am pleased to have with us this morning the distinguished ranking member of this Subcommittee, who does, I think, an absolutely marvelous job in furthering the goals and work of this Subcommittee and I am pleased now to call on the ranking member, Senator Heinz of Pennsylvania. Senator Heinz.

OPENING STATEMENT OF SENATOR HEINZ

Senator Heinz. Mr. Chairman, first, I want to thank you for holding this hearing. I want to commend you for your longstanding interest in the question of our Nation's natural resources. It has been a great privilege and a pleasure to work with both you and your Subcommittee staff on the issue of groundwater.

As you have indicated, Mr. Chairman, this Subcommittee has jurisdiction over both intergovernmental relations and efficient operation of Federal agencies. When the issue is groundwater, what we have found are significant problems in both of these areas. So, we have the responsibility and the duty to investigate, to hold hearings and to consider legislation. As the Chairman has indicated, he not only recognizes that responsibility, let me tell you, he has exercised it consistently in a responsible fashion.

The hearing today will focus on intergovernmental cooperation in groundwater research, analysis and protection. Of course, we will focus on issues of coordination management, which lie within our jurisdiction. Our purpose is not necessarily to craft policy that might be in the jurisdiction of some other committee, but our purpose is very much to ensure that the policies which do or may soon exist are fair, effective and recognize the role which State and local governments are to play.

Groundwater, as Senator Sasser mentioned, is vital. It provides drinking water for fifty percent of all Americans and nearly all water for rural Americans. We have good reason to be concerned about it because almost every aspect of modern American life threatens the purity of this resource. Once contaminated, groundwater is difficult, almost impossible, to clean up. Contaminants often remain in groundwater for years, even decades, migrating gradually into the subsurface water supply.

The Nation's twenty thousand abandoned hazardous waste sites, ninty-three thousand landfills, one hundred eighty thousand surface impoundments and twenty million household septic systems represent some of the potential threats to groundwater. Unless State, local and Federal resources are applied in a timely and coordinated fashion, future generations will be forced to change their water consumption habits because of our mistakes.

Mr. Chairman, what we have before us is a challenge, but it is also a great opportunity because the legislation, which you and I and Senator Roth and Senator Riegle have sponsored, proposes an interagency committee on groundwater in order to provide what you might call a "home" for Federal groundwater efforts.

At present, there are over a half dozen Federal agencies administering nearly a dozen Federal statutes affecting groundwater. There is no single point of reference for States seeking information on groundwater resources. Valuable research and technical knowledge may be available, but it might as well be classified information for it is too often impossible for State and local governments to find the agency, let alone the specific office, which can meet their needs.

Data is stored in countless different forms, using various parameters, and can seldom be cross-checked. Data from USGS often cannot be cross-referenced with data from EPA. At present, State and local governments are charged with the primary responsibility for groundwater, yet the needs of these governments are seldom taken into account when planning and conducting Federal groundwater research and protection.

Our legislation, S. 1992, seeks to enhance interagency cooperation and information sharing. Furthermore, it would provide, through the advisory committee we establish, a vehicle for State and local governments to access Federal knowledge and to make their needs known. This legislation is an important part of efforts to protect groundwater resources and meet the challenge with foresight. It is also essential that we do so because devising a coordinated national research and production strategy to prevent groundwater contamination is far preferable to developing a strategy sometime in the future to cope with groundwater contamination.

Mr. Chairman, I just want to recognize, if I may, that one of our witnesses today is Terry Fabian, the Director of the Pennsylvania Department of Environmental Resources, Office of Natural Resources. It is a pleasure to have him here and I would be remiss if I did not mention that and bring to the attention of those people here a quite important and unique initiative on the part of my State to fund clean water projects, better known as the Pennsylvania Infrastructure Investment Authority, known as PennVest, which will be on our ballot in Pennsylvania next Tuesday for referendum and approval by the voters.

If approved by the voters, as I hope it will be, it will establish a three hundred million dollar bonding authority in order to assure clean water in our State for many years to come. As you know, Mr. Chairman, the Federal Clean Water Act, which we passed last year, establishes a Federal/State partnership to ensure that communities and families have safe and clean drinking water.

Pennsylvania, I am proud to say, is one of the first States to respond to Congress' creation of this partnership by proposing PennVest. Last year, you and I voted for the Clean Water Act and on Tuesday, Pennsylvanians in my State can vote for clean water, too. It is right at the top of the ballot—the PennVest bond issue. PennVest is an investment in our State's future. It will mean a cleaner environment.

It will make our State more attractive as a place to do business and create jobs, and make no mistake about it, there is a lot to be done to build a better future. Some one thousand communities need improvements to their sewage and treatment and drinking water plants. Many of these communities are small and cannot afford to pay the high cost of constructing such improvements and PennVest will attack those problems that urgently need attention. I will be voting yes on PennVest for clean water and I certainly would urge all the citizens of my home State of Pennsylvania to join me.

Mr. Chairman, I thank you very much for the opportunity to have such a distinguished group of witnesses. I look forward to hearing from them.

Senator SASSER. Thank you very much, Senator Heinz. Our first panel of witnesses will consist of Mr. Terry Cothron, who is the Director of the Division of Superfund, Tennessee Department of Health and Environment. He will be joined, as Senator Heinz said, by Mr. Terry Fabian, the Director of the Office of Natural Resources for the Pennsylvania Department of Environmental Resources. And lastly, the panel will consist of Mr. Wayne Ashbee, the Director of the Division of Water Resources, Delaware Department of Natural Resources and Environmental Control.

Gentlemen, if you would, come forward and take your seats at the witness table. I want to welcome you here before this Subcommittee Mr. Cothron, and commend you for the fine work you have done in our Tennessee State government in prior years. We look forward to hearing your testimony today. You may proceed.

TESTIMONY OF TERRY COTHRON, DIRECTOR, DIVISION OF SUPERFUND, TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT [1]

Mr. COTHRON. Thank you, Mr. Chairman and Members of the Subcommittee. I appreciate the opportunity to be here today to discuss some of the important issues raised in Senate bill 1992.

I think the proposal for an interagency coordinating committee is a step in the right direction. While there seems to be much hype and activity in the groundwater arena, this Subcommittee is very accurate in that it is not coordinated. While EPA regional personnel have been very supportive and understanding in our State groundwater efforts, on the national level it seems that no one is singing from the same song sheet.

From the State level, it appears that an increasing amount of resources and dollars may be involved, yet it is difficult to see the results. The interagency committee can be perceived as a new start—that Congress is starting to deal with the problem of aligning confusing and conflicting priorities. However, I have a few technical and linguistic changes to suggest. The interagency committee and the advisory committee should be named appropriately for their mission. Perhaps the words "groundwater management" should be substituted for "groundwater protection" in some places in the bill.

The purpose of the advisory committee might better be defined as addressing the programs, policies and proposals the interagency committee addresses and offering advice to the interagency committee based on State and local needs. It is not apparent that the advisory committee has the power to carry out the charge that it "ensure" that the programs and policies be carried out to meet the needs of State and local governments.

I would also suggest that Section 2(c)(4), which addresses access to information, be deleted in its entirety because it implies information exchange is not a free and voluntary process. The requirement of interagency agreements is a very valid concept, but be careful that the objective does not become the process itself.

The appropriations proposed should take into account the resource needs of State and local governments in supplying information to and evaluating proposals of the interagency committee, particularly for those members of the advisory committee. On the plane yesterday, I did some rough estimates for the case in which

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[1] See p. 73 for Mr. Cothron's prepared statement.

Tennessee might be asked to consult and came up with numbers in the twenty-five thousand dollar to thirty thousand dollar per year range for time and travel and personnel, et cetera.

I would like to suggest that some alternatives be considered for the mandate of the interagency committee. They might consider devising some different, innovative system to deal with groundwater resource management. The groundwater arena is so comprehensive that management of the resource treads on some of this country's fundamental freedoms. For example, it is obvious that one of the tools available to deal with man's activities which impact this resource is land use planning. That is a very sensitive subject. I would say the Farm Bureau building in Columbia, Tennessee probably just raised off the ground as I said those words.

Agricultural activities are perceived by some as a significant source of groundwater contamination. But for some obvious and valid reasons, the agricultural community is resistant to outright control. Yet the farmer is caught in an irony because he is often drinking the very groundwater that he or his neighbors may be contaminating. As a case in point, a recent poll of some Iowa farmers found that the majority were less concerned with more control than with ensuring a clean water supply.

We cannot realistically expect to police all of man's activities which impact our groundwater using traditional regulatory programs and what I refer to as the "hole in bucket" method. Maintaining a good supply of clean groundwater for our future will require a degree of integrated environmental and natural resources management not yet witnessed on any significant scale in this country.

An innovative system to lay good groundwork for good groundwater with minimal regulatory action would be a positive step for the Nation. It is that type of system I hope this interagency committee could address.

It would be a tremendous accomplishment if the interagency committee could deal effectively with even one of the issues currently mentioned in the bill to establish a good working relationship and to establish a good track record. Developing a compatible, coordinated and accessible database on the groundwater resource would represent an excellent start. I believe that if State and local officials could have the applicable information regarding their drinking water and the potential impact of their decisions, we would often need to do little more than offer some friendly advice.

Another idea I hope the Committee will consider is shifting the "bean counts" carried over from the past ten to fifteen years to reflect new initiatives and priorities and reallocate the resources accordingly. This could have general benefit as we State folks continue to see good ideas from Congress, more federalism and less resources.

The question has been asked about whether the system is working now. To that, I often respond, "What system?" The States that have significant and comprehensive groundwater management programs fall into three general categories. One, they are one of the few environmental/public interest bellwether States; two, they are almost totally dependent on groundwater for domestic and commercial use; and three, they have faced a notorious and very controversial groundwater-related problem of statewide or national visibility.

Of these few States, many fit all three categories and most have taken the lead themselves with respect to statutes, policy and resources.

The rest of us still suffer from the groundwater apathy called, "Out of sight, out of mind." In our States, unless the phone is ringing, groundwater concerns still hold the position of an afterthought. To illustrate, Tennessee currently receives approximately one hundred and fourteen thousand dollars from EPA to aid in the development of a groundwater policy. This allocation is still awarded as part of a surface water grant funding formula, which means that the allocation of dollars is not directly tied to the State's dependence on groundwater or to the need for better groundwater management.

In summary, there are enough issues and activities needing a single musical score that the interagency committee and its individual members will have no lack of material with which to work. We, in Tennessee, will gladly assist to the extent of our capability. I appreciate this opportunity, Mr. Chairman.

Senator SASSER. Well, thank you very much, Mr. Cothron. We will have some questions for you in a moment. We will turn now to Mr. Fabian.

TESTIMONY OF TERRY FABIAN, DIRECTOR, OFFICE OF NATURAL RESOURCES, PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES [1]

Mr. FABIAN. Thank you, Mr. Chairman, Members of the Subcommittee. My name is Terry Fabian. I am the Director of the Office of Natural Resources within the Pennsylvania Department of Environmental Resources. Rather than summarizing my written testimony, which has been provided to the Subcommittee, I would like to outline my perceptions of the need for an increased sharing of information in what has developed into one of Pennsylvania's most pressing areas of environmental concern—one of the management and protection of our groundwater resources.

I am honored to be able to present comments to you, since my current areas of responsibility include that of water resources management, soil and water conservation and, particularly, some of the impacts of our farming community/agricultural practices as they relate to groundwater impact, and specifically, the work of our Bureau of Topographic and Geologic Survey within the Department, which conducts studies in the area of aquifer characterization.

In addition to my duties in this position, my previous tenure from 1978 to the end of January this year, the end of the Ashland oil spill, I had been in a previous position as the Regional Environmental Protection Director for the ten County Southwestern Region in Pennsylvania, headquartered out of Pittsburgh. In that position, I was responsible for the management of our regulatory activities involving water pollution control and, particularly, groundwater impacts from hazardous waste management, municipal waste disposal, oil and gas well drilling and the mining industry.

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[1] See p. 84 for Mr. Fabian's prepared statement.

When you take the overlap of responsibilities, you can tell from my comments and my current job responsibilities and those of my previous position that there is really an overlap when you consider groundwater needs. What we are talking about is groundwater management and a part of that is managing the resource—concern over quantity and availability of water and how we plan to use it, as well as groundwater protection, that of the quality issue. I do not think we can separate the two.

When we talk about available information and coordination, we have parallel agencies at the Federal and the State level and basically, the staff in those areas of program responsibility deal with their counterparts within the State and within the Federal agency. But, unfortunately, there is a real lack of understanding of staff who are dealing with what I would term a "pigeon-hole" piece of the problem, in terms of what other information is out there and available to help them do their job.

I say that knowing full well that it exists between State and Federal agencies, simply because I know that the coordination of groundwater information and programs within our own Department of Environmental Resources is not up to par with what I think we all would agree would be a good management practice.

There is, therefore, definitely a need for improved coordination of activities. When I look at some of the needs within Pennsylvania and we have fifty States that we are really dealing with throughout the country, what are the research and technological development needs that we have. It would be rather foolhardy for us to go and see us proceeding in the same direction through fifty different State agencies. I think the coordination of research needs and technology transfer is one of the most outstanding attributes that would come out of S. 1992.

I can relate the need for information coordination to my experiences when I first went into the Pittsburgh Regional Office back in 1978 and at the time, they called me a Regional Coordinator and there was a lack of coordination between our various environmental protection activities. That coordinator was, in fact, to get lines of communication going between the programs and ensure that we were not going off in opposing directions on a given environmental problem because we had different bureaus involved from the regulatory standpoint.

I think that in much the same way, we have to look at a coordination of our groundwater effort to ensure that the people using the information know where to get it. I think that is a very key issue that has to be dealt with.

One comment that I have heard from some of our staff is a concern over compiling a massive database and the reliability of information. One thing that would have to be guaranteed would be the quality of the data. In any coordination program and, particularly, if we would move to a point of having a large database, we would most certainly have to have data that is reliable for the functions of each of the user agencies. A quality assurance/quality control program would be necessary to ensure the reliability of that data.

One other concern that I would have is to look at things on a national basis. Country-wide, the groundwater resources themselves differ and we have differing needs for their overall management. If I look simply within the State and to be very general in approach, Pennsylvania has very different needs for managing our groundwater resources in the Southeastern part of the Commonwealth, where we have rapid residential development occurring, compared to the Central region of the State, which is characteristic of limestone geology and looking at the Southwestern part of the State, where we have basically a coal geology and much different impacts and quality of existing groundwater, a difference in terms of managing the need.

I question whether an advisory committee of eleven people from State and local governments would, in fact, be able to meet all of the various needs we would have throughout the country and would suggest that we look at advisory committees, at least, on a regional basis; that we have common needs that we are addressing among the States.

I was very pleased to hear Senator Heinz' comments on PennVest. In the opening statement, there was the indication of some of our different water quality problems that we have and a statement of the number of on-lot sewage systems that we have in this Nation. Pennsylvania has a very strong reliance, particularly in its rural areas, of on-lot sewage systems and they are a major impact on groundwater resources. Hopefully, what we will see through our PennVest program in Pennsylvania is addressing those needs where we have a more concentrated rural population and can move toward meeting those sewage needs and protecting groundwater.

I would like to conclude my comments with an example in management of a resource and a problem which occurred within Pennsylvania. We have a State park, which is located out in Somerset County and we have a commercial ski resort which is in close proximity to it and they were desirous of accomplishing a land transfer with our Department to increase their development of their ski resort.

It made sense to do it. We got a lot more out of the land trade, in terms of land coming back to us in our forestry operation. However, the piece of land that we transferred to them was adjacent to a point of groundwater discharge, a spring, which serves as the major source of stream supply and is necessary for continued operation of a bathing beach at the lake during the summer.

What happened was, the ski resort dug, drilled, a water well and uses it for both their snow making operation during the winter and their public water supply during all periods of the year. During low-flow conditions, the proximity of the well and where it is withdrawing water from the aquifer reduces the flow in that spring. We were not very good as managers in evaluating the big picture, the total picture in terms of what potentially could happen to us from a groundwater resource standpoint and now have to look at other alternatives to protect our State park and the water quality and quantity that we have there.

It is that kind of thing in terms of identifying the water resources and what potential impacts you have, not only on actions which could directly pollute groundwater, but also result in the overall need for a management of our groundwater resources.

Thank you for the opportunity to present comments.

Senator SASSER. Thank you, Mr. Fabian. We will turn now to Mr. Ashbee from the State of Delaware.

Senator HEINZ. Mr. Ashbee, could I just say—Senator Roth was very desirous of being here to introduce you today. Unhappily, he is co-chairing another hearing. Otherwise, he would be here, not only to introduce you, but to hear this testimony. But he wants to express his regret and I do so on his behalf, that he cannot be here to welcome you and to participate with you.

Mr. Chairman, I ask unanimous consent that Senator Roth's statement be included at this point in the record

Senator SASSER. It will be included in the record.

[The statement referred to follows:]

OPENING STATEMENT OF SENATOR ROTH

Mr. Chairman, I want to commend you for scheduling this hearing on S. 1992, legislation to promote better coordination in the development of our Nation's groundwater policy.

A safe and secure supply of groundwater is vital to the health and safety of our citizens. Yet this important resource is threatened on a daily basis by many activities associated with modern life. S. 1992 addresses this concern by creating an interagency group with a clear mandate to ensure better coordination among Federal agencies involved with groundwater issues and cooperation as well among the levels of government in our Federal system.

I am very pleased that we have before the subcommittee today a representative of Delaware State government who will address the Federal agency as well as the intergovernmental aspects of this major national concern.

I would like to welcome before the committee Mr. R. Wayne Ashbee, Director of the Division of Water Resources in the Delaware Department of Natural Resources and Environmental Control.

Wayne spent most of his professional career with the Du Pont Company where he served in numerous positions in the employee relations, and the engineering and manufacturing departments. Following his retirement from Du Pont in 1985, Wayne joined Delaware State government and in October of 1985 assumed the directorship of the division of water resources.

With this background Wayne is well suited to address the interagency as well as the intergovernmental aspects of the bill. Wayne, welcome to the subcommittee and I look forward to your remarks.

TESTIMONY OF WAYNE ASHBEE, DIRECTOR, DIVISION OF WATER RESOURCES, DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

Mr. ASHBEE. Mr. Chairman, Members of the Committee, my name is Wayne Ashbee. I am Director of the Division of Water Resources for the State of Delaware

Thank you, Mr. Heinz. This Division, my Division, is the State agency responsible for, among other things, the management of water quantity, conservation and development. On behalf of the Governor of the State, I want to thank you for the opportunity to testify on this bill and to commend you for what we hope is continued interest in the coordination of all Federal efforts in the development of sound groundwater policies. While we believe strongly that all Federal programs must, of necessity, be coordinated to obtain the maximum use of Federal resources, we believe that the States must have the primary responsibility for the groundwater management.

For years, we have supplied water to our growing population without giving due consideration to such areas as the infrastructure, construction in rural or low-density areas or the replacement of aging equipment which, in the water supply area, is frequently privately owned and also without the formation of adequate enforceable regional policies. Such policy consideration is mandatory because our water supply sources know no boundaries.

We at the State level have limited funds and cannot support the technical assistance programs or extensive research programs necessary to ensure the most beneficial use of the groundwater resource supplies, nor are funds available for adequate analysis of the small water supply systems.

The groundwater problems are complex and will be more so as we try to solve the problems of non-point source pollution, the number of NPDES discharges and on-site sewage disposal systems increase and as transportation related accidental toxic chemical releases occur. Further, a potential shortage of certified labs, lab personnel and approved economic analytical procedures will not lessen the problems as the States attempt to monitor the new water quality problems.

As we understand S. 1992, its intent is to enhance coordination efforts between the agencies involved in ground water use research and regulatory work. Such efforts are commendable if it eliminates the duplication of efforts and results in improved dissemination of technical literature and data, and if it moves and expedites research into areas which are now restricted to States and municipalities due to the exorbitant costs of such research.

We feel it is necessary, however, to point out that we currently see some coordination of effort, not only between Federal and State agencies, but between technical organizations and these same Government agencies. We also see the lack of such efforts. The programming of said cooperation would appear to be easier and more responsive and certainly would impose less of a strain on the smaller organizational budgets if they could be assured of a voice in the development of a national program.

We are somewhat concerned that the issues which develop as a result of this mandated coordination should not develop into a national scenario similar to the construction grants program, the end of which is creating problems to some State and local authorities.

We would hope that as a result of the proposed closer coordination between agencies and advisory groups, we would experience a more efficient use of limited funds or new funds could be generated for the new research and programs. Further, that any coordination effort should not place a large reporting burden on States and municipalities. As for specifics on the bill, I would suggest the following:

Under Water Policy, I would urge the inclusion of research as an area where the Federal effort could be directed to provide evaluations which cannot be handled by the smaller institutions and organizations.

Under Duties, the statement made that the interagency committees shall do items a through f, but does not indicate the authority or means of carrying out the elimination of duplication, should a memorandum of understanding not be reached by mutual consent.

Under Consultations, it would seem that if there is to be complete freedom and cooperation between the agency committee and the advisory committee, that it would be desirable to have a regular distribution of agency meeting minutes, et cetera, between committees rather than requiring the information to be formally requested. An alternative might be to have a single committee.

Under Advisory Committee, with the advisory committee being limited to eleven, it would seem desirable to designate regional representatives who would meet with other major State or local government representatives so that no section of the country is shortchanged and all have some means of input. The larger technical, water-oriented organizations should also have an avenue for providing input.

In conclusion, Mr. Chairman, on behalf of myself and the Governor of the State of Delaware, I wish to commend the Committee for their foresight and initiative in recognizing the need for continued closer cooperation of all water management agencies and for providing the means for those nearest to the problem to have input through the establishment of the advisory committee. I thank you again for the opportunity to speak to you today.

Senator SASSER. Well, thank you very much, Mr. Ashbee. Mr. Cothron, as I noted in my opening statement you have to deal with as many as sixteen Federal agencies in managing groundwater. I will ask you if this proliferation of Federal agencies with overlapping jurisdiction poses a problem for a State official who is trying to develop a coordinated groundwater management policy.

Mr. COTHRON. Certainly it does.

Senator SASSER. Well, for the record, could you provide us with cases or instances where you feel that Federal agencies have not been as helpful to you as they might be? [1]

Mr. COTHRON. Sure.

Senator SASSER. Because of the lack of their coordination or because of lack of cooperation?

Mr. COTHRON. Sure. Let me point out that the normal situation is that at the State level, we are normally dealing with one Federal agency, but in the process, may have to involve several other Federal agencies that also have some interest in the particular project or problem at hand and many times, several contractors working for each one of those agencies. It is not uncommon not to be able to get into a room for a meeting of that sort.

There have been problems in the past, particularly with the Department of Defense Installations and some of their contractors and with the Department of Energy. To give a couple of examples, the Memphis Naval Depot, which we had suspected had dumped materials into the Hollywood dump several years ago, which we worked hard on in the early 1980's, seemed that they had to go all the way to Washington to even secure the permission to work with us, much less to provide any information, and that information was a long time coming. And, as was not unique to most of those types of old abandoned dump sites, it was rather spotty when we did get it.

With the Department of Energy, at the Oak Ridge reservation particularly, we tried for years to do some enforcement there based on inspections under different Federal and State statutes—State statutes we had direct authority for and Federal statutes for which we had primacy delegations. The Department of Energy's position for many, many years, to the extent that they missed Federal deadlines under the Resource Conservation Recovery Act, was that they were exempt from that Act. It took a court case to resolve that issue.

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[1] See p. 80.

Another position was that the water behind the fence at the Department of Energy—and this is not unique to the Department of Energy, this is typical of almost any Federal agency—is Federal water and therefore, the State has no jurisdiction. Well, the point is, the water does not care if it is Federal water or State water or local water and the people who might be impacted by it could care less. To them, it is all a Government problem and we need to solve it.

We are probably more fortunate in Tennessee in general than some of the other States I hear about now, in that the situation has improved dramatically, I think, through a combination of public demand, persistence on our part, circumstance and luck. We have much better cooperation than we had in years past from all Federal agencies, and particularly from the Department of Energy.

It is still fragmented, however. We continually run into situations or encounter issues that are precedent-setting in their nature. For example, when the Department of Energy commits—and they have committed millions at Oak Ridge to do clean-up work and to put in facilities for water treatment and hazardous waste disposal, et cetera—but when they make that commitment, it is often a precedent-setting situation and they have to look at that on a country-wide basis. What that means is that every time one of those issues comes up, and it is confusing or is precedent-setting, we have to come all the way to Washington to try to resolve that issue and involve several other installations in the process. It is very time-consuming and while that is going on the problems are usually spreading and getting larger.

Senator SASSER. Well, Mr. Cothron, one of the key duties of a State groundwater management official, as I understand it, is to identify the sources of groundwater pollution and then to try to take effective action to deal with the problem to alleviate the problem. Now, as I understand it, when you identify a pollution problem that requires you to notify and possibly work with a Federal agency, timely enforcement is of the essence.

What has been your experience with the various Federal groundwater agencies when you have identified a groundwater pollution problem and you have asked for their assistance in dealing with the problem? Do they respond in a timely fashion or are there bureaucratic delays? Just explain what you encounter.

Mr. COTHRON. I will refer to my previous answer, sir, and indicate that we are much improved in Tennessee in that regard, although we have some problems remaining. The answer to your question is yes and no, and it sort of depends on the particular installation or the particular problem. In either event, if the willingness to cooperate and accept responsibility and address the problem exists, there is still what appears to be a very long, drawn-out bureaucratic process to reach an endpoint. Sometimes that is justifiable because the problem is very hard to define, and therefore, the solution is hard to identify. Other times, the problem is very clear and understandable and the solution is also clear and understandable and we still have some long delays.

Senator **Sasser**. Senator Heinz?

Senator **Heinz**. Mr. Chairman, thank you very much. Let me ask Terry Fabian first, is your office routinely informed of Federal activities and policy?

Mr. **Fabian**. From a groundwater information standpoint or from a regulatory enforcement standpoint?

Senator **Heinz**. A groundwater information standpoint.

Mr. **Fabian**. Well, again and to reiterate some of the comments from Mr. Cothron, I think a lot of our staff at the various program levels within the Department of Environmental Resources have built up a very good working relationship with their direct counterparts and there is a parallel between programs within the Environmental Protection Agency and programs that we carry out.

To me, we have an excellent working relationship and share data. Unfortunately, it is, as you said, on a luck basis. It is more happenstance in terms of whether you get the right information. We have an extremely good working relationship between the USGS and our people in the Bureau of Topographic and Geologic Survey. The point that I see is of a real need to coordinate information between agencies.

The people in our regulatory programs within Hazardous Waste Management, for example, should know what data and information is available to help in their regulatory process from the USGS and from within Pennsylvania, even from our own Bureau of Topographic and Geologic Survey. So, the need to me is a coordinated basis because we have a lot of pockets of valuable information out there and not that there is a reluctance to share it, but in most cases, people do not know where to go to get the information and it is not coordinated.

Senator **Heinz**. Thinking very specifically about the needs of your department in Pennsylvania, what if their needs should be met specifically by either Federal technical research or other assistance?

Mr. **Fabian**. I think the areas of, number one, research both in terms of groundwater protection, mitigation of contamination, movement of contaminants through the groundwater system, remediation of contaminated groundwater—those are issues that have a nationwide impact and are program problems that we have. In Pennsylvania, we do not have any significant monies whatsoever to go into research needs and the area of research of our groundwater problems and how to solve them, I think, can best be met by the Federal Government.

In addition, as we have technological advances, I think there has to be what I would call a technology transfer. Let's get information out to the State and local agencies that can use them in solving some of the problem issues that they have to deal with on a case-by-case basis.

Senator **Heinz**. Let me ask either you, Mr. Fabian, or you, Mr. Cothron, what Federal activities affecting either of your departments are, in your opinion, either unnecessary or duplicative of those tasks performed by any other Federal or State or local agency?

Mr. **Fabian**. I think it would be hard to pick out examples where it is duplicative. A lot of them probably are not even known at this point. In talking to staff within my office and our Topographic and Geologic Survey, I learned that we are doing some characterization of groundwater aquifers in several areas of the Commonwealth. To me, I am not aware of anyone else conducting that type of study in that location. If I were, we would surely be raising a red flag and let's try and coordinate the work that we are doing so we get the biggest bang for the bucks so that our limited resources are used most effectively.

I am not aware of the existence of those right now. Those would be the first ones that I would be screaming about, and yet, I am sure that they are out there and there is simply a lack of awareness between different agencies at the local, State and Federal level and their other counterpart in the other unit of Government carrying it out.

Senator **Heinz**. Mr. Cothron.

Mr. **Cothron**. I would like to follow up on that in two regards. I generally agree with Mr. Fabian. I do not think there are any Federal programs that are designed on existing authorizing legislation or regulations or even policy initiatives that are duplicative by their design. I think, however, when it comes to implementing those programs, that often they verge into the same activities and while one agency, EPA or USGS primarily, is designing some State-wide or some regional-wide activity to ensue, like assessment of the resource or characterization of the resource, at the same time, other agencies are doing something within that same sphere of a much smaller nature.

If they got together on the front end and did the total design and included the specific activities within the general plan, we could have a lot better and more effective use of resources. Secondly, I would say that in some cases, oversight has become a reason for justifying the same level of resources that we had last year and that after we have delegated a program to State authority to be enforced, we are still coming right behind them and doing the same things we had always done with some of the Federal agencies.

Senator **Heinz**. Now, regarding data, specifically data collection or provision, do we have some specific problems there? Are there any either duplicative or vastly different formats that create problems?

Mr. **Fabian**. We do have some groundwater databases that are in use and we at the State level participate in adding information to a groundwater storet system, for example. But there are differing database systems, depending on whether you are dealing with USGS or EPA or the Office of Surface Mining, and I do not see the coordination of those different Federal agency databases at all.

Senator **Heinz**. You are talking about the difference between EPA and USGS?

Mr. **Fabian**. Correct. We again look on our parallel basis of the parallel State to Federal agency as participating in some of that groundwater data management, and yet I see it at a much higher level, as proposed in S. 1992, that you are coordinating information among Federal agencies. I do not see that being done on a very comprehensive basis.

Senator **Heinz**. I would suspect that if we had USGS and EPA here, they would say, well, we have very different informational needs and they would justify having different databases. But do their databases need to be different? Could they address their own unique needs and still have a consistent database?

Mr. **Fabian**. I think there are some differing needs, but there is a tremendous overlap that is there. That is why I had mentioned the need to have reliable data and the comments I hear are more on reliability of data and do you have a good quality assurance program for the actual sampling and analysis. If you, in fact, have that and you have established your sampling protocols and designed a study for characterization of a groundwater aquifer, for example, I think that data could be used anywhere where the information is necessary to carry out that function.

I think it can, in fact, be done with an overlap of information, if it were coordinated well and we looked at that reliability of data issue.

Senator **Heinz**. I have a question for Mr. Ashbee and I am rushing a little bit because we are going to have a vote here. Mr. Ashbee, I want to get specific about some of the suggestions you made on the legislation. You mentioned, most particularly, the advisory committee. Obviously, if our process is going to work, the advisory committee, which will, we hope, effectively establish priorities for the interagency committee for data generation, collection and dissemination, needs to be as broad and as knowledgeable and as sensitive as it can be.

You mentioned, quite properly, the need to ensure regional representation. You also, in your statement, indicated the need to include organizations, national organizations with technical expertise. What did you have in mind there?

Mr. **Ashbee**. The area that I was thinking about was, particularly, ASWIPCA, for example, or WPCF or ICWP. Those organizations are basically groundwater or wastewater treatment facilities, technical organizations and as such, they have a large constituency from which they draw regularly to develop policies and programs on their own and much of that information from a technical point of view is readily available for other persons to use.

Senator **Heinz**. Mr. Cothron, would you agree with Mr. Ashbee's suggestions?

Mr. **Cothron**. I am not sure that any of those three agencies had, at their heart when they originated or their work over the last ten or fifteen years, groundwater as their top priority. I have asked someone to search out their top four or five national legislative priorities for the upcoming session and I will be surprised if groundwater is in the top five.

At the moment, while everybody seems to jump on the bandwagon and be really concerned, and there is vital reason for that and I am glad they are interested, I am not sure that either one of those agencies has, at its heart, groundwater as its top priority.

Senator **Heinz**. What advice would you give us about ensuring a properly represented advisory committee?

Mr. **Cothron**. I agree with both Mr. Ashbee and Mr. Fabian that the country needs to be represented regionally, regardless of the numbers involved. National consistency is needed on health standards—for instance, if a compound is carcinogenic at one level here, it is that same way in California. On the other hand, the geology, the terrain, the topography, the hydrogeology are much different and the needs of the community are much different—industry, agriculture, et cetera—and there is where the flexibility can be built in. I think every general region of the country should be represented on that advisory committee.

Senator **Heinz**. Mr. Fabian, any disagreement?

Mr. **Fabian**. No. In fact, I guess I would look at it in—hating to add another tier of the bureaucracy—but actually having regional advisory committees and perhaps a representative from each one of those on your formal advisory committee to the coordinating committee.

Senator **Heinz**. Mr. Chairman, you have been very generous with me and my time. Thank you.

Senator **Sasser**. Well, thank you, Senator Heinz. Gentlemen, we are going to conclude with your testimony here today, but before doing so, number one, I want to thank you very much for appearing here today and giving us the benefit of your views. They have been exceedingly helpful. I am going to make one further request.

I am going to ask each one of you to supply a further detailed statement of some of the problems that you may have encountered in working with various Federal agencies that have groundwater management responsibilities. We have various Federal agencies dealing with groundwater. We have a whole host of Federal laws that impact on your ability to manage your groundwater and control groundwater pollution.

In the final analysis, though, you are the ones that have to manage your groundwater sources and protect your groundwater from pollution. I believe that the legislation that we are examining today, S. 1992, can help you do your job better. But before we move ahead with this bill, we want to have a systematic record or as systematic record as possible of the coordination problems that are encountered with Federal agencies as you attempt to work with them in your groundwater programs.

I think if we have a full and complete record we will be more effective in concluding legislation that will get the job done because we will be more effective in persuading our colleagues to support this legislation. Gentlemen, thank you.

Senator **Heinz**. Mr. Chairman, if you would yield for a comment.

Senator **Sasser**. I would be pleased to yield.

Senator **Heinz**. I want to endorse the Chairman's request. Indeed, if we had had more time and maybe I could include it in the Chairman's request—I asked the staff to prepare this chart, which lists and develops the variety of Federal agencies that have one role or another in groundwater management or protection.[1]

It would be useful, I think, Mr. Chairman, if in addition to what you have asked more generally, it would be helpful to look more specifically at the agencies you indicated, in writing as a submission if we could, which offices and programs administered by those offices tend to be more in conflict and less in sync, so that we have, as part of our complete record, that information. We will supply to you copies of this chart if that will be helpful.

Mr. Chairman, I commend you for your request and I, as I say, endorse it.

Senator SASSER. Thank you very much, Senator Heinz. Gentlemen, thank you for appearing here today and giving us the benefit of your views.

Our next panel today will consist of Mr. Dayle Williamson, from the Interstate Council on Water Policy and he is the Director of the Nebraska Natural Resources Commission. He will be joined by Mr. Norman Johnson, the Legal Counsel for the Western States Water Council. I believe that is headquartered in Utah, is it not, Mr. Johnson?

Mr. JOHNSON. That is correct.

Senator SASSER. Gentlemen, we are pleased to have you here today and we will ask you to begin. I will warn you ahead of time that we have a vote that was scheduled to go off twelve minutes ago. We have a way of delaying these things here in the Senate, but we will get started and go as far as we can before the vote comes. Mr. Williamson, we will start with you.

TESTIMONY OF DAYLE E. WILLIAMSON, INTERSTATE CONFERENCE ON WATER POLICY AND DIRECTOR, NEBRASKA NATURAL RESOURCES COMMISSION

Mr. WILLIAMSON. Thank you very much, Mr. Chairman and Mr. Heinz. It is a pleasure to be here today. I am Dayle Williamson and I serve as Chairman of the Groundwater Task Force of the Interstate Conference on Water Policy, a group of States. I have served as that Chairman for quite a number of years and we do have a high interest in groundwater and I am also the Director of the Department of Natural Resources.

I have my written statement that I will enter for the record and I have also responded to the questionnaire. My written statement is on behalf of ICWP.[2] I received the questionnaire just earlier this week, so that is really on behalf of the State of Nebraska. I did not have an opportunity to provide that to the other members, so some of my views in that questionnaire may be a little bit different than we would find from our membership.

One of the major points that I would like to emphasize is that State government is very concerned about groundwater management, both quantity and quality. We began with the quantity management issue. I served on the Ogallala Aquifer High Plains study activity and that was certainly most directed toward quantity. Our concerns in the past few years have moved to the quality concerns and we must seek ways—additional ways—to prevent pollution.

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[1] See p. 291.

[2] See p. 88.

There are, of course, different views between the States in the methods of groundwater management because the States are very much different. But we all strongly back the principle that the primary responsibility for groundwater management does reside with the States and must continue to reside with State and local governments.

In my particular State, we have given a lot of responsibility also, to local government and we like it that way. We know that we need help. We know that we certainly cannot do it alone. On the charts we see before us with all of the Federal agencies, there is a great deal of expertise there. We need to coordinate with them closely.

We see S. 1992 as providing an excellent vehicle to help us do that effort and precisely the type of effort that those of us in ICWP have been thinking about for a long time. Things that must be done in the future are costly. We cannot afford duplication. Our local districts that are managing this are putting in considerable money. At the State level, we cannot afford to duplicate what they are doing. We need to know what they are doing and likewise, on the Federal level.

Again, I would point out that we must rely a great deal on additional expertise from the Federal level. I feel that there is some concern. In fact, I have contacted Federal agencies at the Washington level and, in their consideration, this coordination is really taking place. I do report to you that there have been giant strides to have good coordination in groundwater management activities.

Through ICWP, we did work on a committee with the EPA when they developed their groundwater protection strategy. In fact, I represented the organization on that committee. The United States Geological Survey, at this very time, is establishing a committee. Dick Hofman, our member from New Jersey, reported to me yesterday that he has been working closely with USGS in tying States into that effort they are working on.

I hope every State, at this time, is looking within their own borders to look at the coordination effort at home. I just participated with our State Soil Conservation Service Office in the past three days in a three-day planning conference and we see a giant stride in Nebraska in tying all the Federal agencies and State agencies together in our efforts in groundwater pollution.

In Nebraska, since we are a rural State, much of our pollution does come from agriculture. We see that our agricultural agencies, like the Soil Conservation Service, have an excellent delivery system and so some of the things envisioned in areas like non-point source, three hundred nineteen of the Clean Water Act, we think that that would have to be done through an agricultural system. So, we believe that that coordination effort will work greatly.

At home, for a long time, I have met with both State and Federal agencies involved in this, on a monthly basis on all issues and we are going to concentrate, certainly, as groundwater activities come up. Now, those who say that S. 1992 is not necessary because coordination at the Federal level has improved, really miss our view from ICWP because we feel the most significant part of the bill is the requirement that the interagency committee identify State technical assistance, information and research needs and develop priorities and a plan for addressing those needs.

We feel that is very important and this type of effort is essential if State and local governments are to effectively address their groundwater problems. Thank you very much, Mr. Chairman.

Senator SASSER. Thank you very much, Mr. Williamson. We will turn to Mr. Johnson now.

TESTIMONY OF NORMAN JOHNSON, LEGAL COUNSEL, WESTERN STATES WATER COUNCIL

Mr. JOHNSON. Thank you very much, Mr. Chairman. The Western States Water Council, for your information, is an organization comprised of representatives appointed by the Governors of sixteen Western States. Council members meet quarterly to consider a broad range of policy issues related to the management, protection and development of the water resources in the West and we are grateful for this opportunity to present our views on the subject of national groundwater policy.

As is true throughout the Nation, groundwater is a critically important natural resource in the West and I believe, by and large, Westerners understand this and are willing to take the steps necessary to assure that groundwater is of sufficient quality to allow for its continued beneficial use.

The Western States are geographically and economically diverse and understandably, Western State legal institutions for the protection of groundwater quality differ. However, it is important to realize that all Western States have such institutions. In addition, virtually all Western States have legal schemes to govern groundwater allocation. Once a groundwater permit is issued under such laws, the permittee has a legal right, considered a constitutionally protected property interest, to withdraw a certain amount of groundwater and put it to continued beneficial use.

There is widespread agreement that the States should continue to have the exclusive responsibility with regard to the creation and administration of groundwater rights. It follows that any proposal for Federal groundwater legislation should be carefully constructed so as not to interfere with the States' prerogative and ability to manage and protect those rights.

The Western States Water Council has published a report entitled, "Western States Ground Water Management," which contains a State-by-State summary of groundwater quantity and quality programs for fifteen Western States. I have submitted, with my testimony today, a copy of this report so that it can be included as a part of the record of this hearing.[1]

As you know, a number of bills with the objective of enhancing national groundwater policy have been introduced in this session of Congress. The Council has taken no position with respect to these bills, per se. However, it has agreed upon basic principles related to national groundwater policy which are important and which I would like to describe.

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[1] See p. 92.

First, groundwater management—the protection of its quality and its allocation for beneficial use—requires careful coordination among all levels of government. To this end, the Council supports a national policy to guide the actions of Federal agencies as they administer programs which impact groundwater. This policy should apply to all Federal agencies with groundwater responsibilities and should be developed and implemented as a joint Federal/State effort which also recognizes the role of local government.

Second, State and local governments should continue to have primary responsibility for groundwater management, both quantity and quality. The Federal role should be in support of and in accord with State and local groundwater management and protection programs. Thus, it must be flexible enough to recognize the differing legal, hydrologic, climatic, economic and social factors that exist in various States and regions.

Third, Federal technical assistance should be enhanced under any new legislation. Where some State programs have been less effective than others in achieving groundwater protection goals, the underlying problem has nearly always been the lack of technical and financial resources. Any new Federal funding for groundwater efforts should be directed particularly toward providing increased and enhanced technical support and should emphasize Federal/State cooperative programs.

In this regard, the following kinds of technical assistance would be beneficial. (A) assessing the extent of groundwater contamination; (B) other data gathering and management; (C) maintenance of a strong and productive research program; and (D) facilitating information exchange.

Fourth, any new Federal groundwater legislation should seek to ensure a good neighbor policy that requires all Federal agencies to conduct their activities which have the potential to affect groundwater in accordance with State groundwater management programs. In this regard, lack of coordination and cooperation by Federal agencies with State governments has contributed to difficulties in the past.

As I am sure you are aware, Federal lands constitute a majority of the land base in the several Western States. Some of the most troublesome groundwater contamination problems which currently exist in the West are directly the result of Federal activities on Federal lands. I have attached to my testimony a brief description of some of these problems.

I would like to reiterate that the members of the Western States Water Council hold, as a high priority, the commitment to work with Congress and others to encourage efforts at the Federal and State levels that support, not undermine, override or otherwise impair the successful administration of State groundwater management programs.

The Council recognizes that these recommendations are based on active and assertive State protection and management efforts. With the Federal Government providing appropriate support, the Council is confident that each of its member States will meet the challenge of providing these essential efforts. Again, the Western States Water Council appreciates this kind invitation to testify.

Senator **Sasser**. Gentlemen, thank you very much. The Subcommittee will stand in recess briefly while we go to vote and we should reconvene—my best estimate is in about ten minutes. The Subcommittee will stand in recess, subject to the call of the Chair.

[Recess.]

Senator **Heinz**. Senator Sasser has asked that I reconvene this hearing in his absence. I also have a statement from Senator Mitchell that he has asked be included in the record, which I am happy to do.

[The statement referred to follows:]

Opening Statement of Senator Mitchell

Thank you, Mr. Chairman. I share the concern of other members of the Subcommittee for protecting the quality of our ground water resources.

Ground water is a natural resource of great importance to the country. Half of the population of the United States, and the great majority of those living in rural areas, rely on ground water for drinking water.

Ground water contamination is a problem in virtually all areas of the country. Today we will hear about ground water problems and issues in several States including Tennessee, Delaware, Pennsylvania, and Nebraska.

The State of Maine has not escaped ground water pollution. Throughout the State there are increasing reports of ground water pollution problems associated with leaking underground storage tanks, waste disposal sites, and subsurface sewage disposal.

I want to express my appreciation to Senators Heinz, Sasser and Roth for their efforts to develop legislation to bring about better coordination of the many Federal agencies involved in ground water research and pollution control. S. 1992 provides a useful framework for discussion of appropriate measures to assure coordination of Federal agency activities and policies, better information dissemination, and active participation by State and local officials.

In addition to this Committee, I serve on the Environment and Public Works Committee. Ground water protection has been a primary interest of the Environment Committee for some time and the Committee is currently considering several bills relating to ground water protection.

S. 20, introduced by Senator Moynihan, provides for a comprehensive program of research, assessment, and assistance to State agencies in development of ground water programs. S. 1105, introduced by Senator Burdick, provides for an extensive ground water research program to be implemented by various Federal agencies. S. 2091, introduced by Senator Durenberger, provides a detailed program of ground water assessment and pollution control.

Each of these bills addresses the need for improved coordination of Federal agencies to some degree. S. 20 provides for interagency coordination in several issue areas and specifically addresses coordination between the EPA and the USGS.

Section 403 of S. 1105 specifically addresses the issue of coordination of research programs and provides for a periodic report to the Congress on ground water research an interagency coordination issues.

Section 803 of S. 2091 provides for coordination of ground water programs and establishment of a task force of Federal agencies to oversee ground water policy. In addition, Section 804 provides for a ground water advisory committee made up of representatives of State and local governments and other interested parties.

The Environment and Public Works Committee has held two hearings of pending legislation and a final hearing will be scheduled in the near future. I know that my colleagues on the Environment Committee will be very interested in the testimony on this legislation and I expect that they will want to work with the Subcommittee to develop the best possible program to assure coordination of ground water policy and protection of the ground water resource.

Thank you, Mr. Chairman.

Senator **Heinz**. I would like to apologize to both of you, Mr. Johnson and Mr. Williamson, because I missed most of your testimony. I do have a few questions from what I understand of your testimony, but if I have inaccurately understood what you said, please correct me so that I am brought up to the state of the art of your testimony.

Let me ask Mr. Williamson. Mr. Williamson, in your experience, is legislation needed to ensure that the Federal Government is committed to coordinating its groundwater research and program management functions? The Administration's response to our efforts has so far been that they think they are doing fine and that legislation is not needed. They would argue that the Office of Management and Budget is coordinating policy among agencies and that the President's Scientific Advisory Committee is coordinating research.

Would you agree with the contention that the Administration is doing fine and that we have nothing to worry about?

Mr. WILLIAMSON. The Administration, at the present time, has made many positive moves forward on the groundwater issue since it is a big issue, but my testimony and our thoughts through ICWP, we want to assure that that continues in the future as Administrations change and as high priority issues change. So, that is why we feel strongly that S. 1992 is certainly important.

In the questionnaire that the Committee provided, I answered questions five and six on a very specific example that I did have. I personally worked on it and was part of the study effort—the High Plains Ogallala Aquifer study. It was a groundwater decline study. Six Governors served on that council and two Federal agencies. As we completed the report in 1983, we turned it over to the Secretary of Commerce.

The Secretary in turn was to turn it over to Congress and to the best of my knowledge, that has never been completed. The coordination just really dropped at that point. So, that was a very specific example. I think the reason it dropped was because the national interest from groundwater decline sort of waned at that time. Even our interest waned because it began raining more, but we will continue to have groundwater declines.

Senator HEINZ. If the Administration says OMB can do everything that the interagency committee established by this legislation can and will do, they will do at OMB, would that be possible? Would that be likely?

Mr. WILLIAMSON. It could sure be likely right now, but I always wonder about the future. If OMB desires to do something else, then the emphasis is placed at a lower level.

Senator HEINZ. If you were asked to summarize, as neatly and concisely as possible, what the States need, at least in your opinion, from the Federal Government to carry out groundwater protection and management efforts, what would it be?

Mr. WILLIAMSON. The States need broad research efforts. The States need certain areas of expertise. My personal opinion—and I know some States will answer differently on this—groundwater mapping is a responsibility that should be carried out by the States themselves. Those type of things that can be done by the States very cost effectively, but the health issues, those have been brought up, the parameters we must work within and so on, are the broad issues—that is the area that we need Federal assistance in.

Senator HEINZ. Mr. Williamson, thank you. Mr. Johnson, as you may recollect from my opening statement, I discussed the critical nature of groundwater to our health and well-being and, given the extent of the potential harm to our groundwater resources, can States meet the challenge of managing and protecting groundwater without the Federal Government taking some responsibility? Will you have the technical and financial resources to assume this burden if there is not some Federal responsibility?

Mr. Johnson. I think the States are in a good position, as I mentioned, with appropriate Federal support, to carry out their responsibility to protect groundwater. That support might best come in the form of technical and research assistance. The Council has not, in the recent past, identified specific research needs which would be most appropriate. However, I would incorporate here the results of a survey by ASIWPCA, which is the Association of State and Interstate Water Pollution Control Administrators, where they have recently surveyed their States—this is a national organization—and identified a variety of research needs and provided the State perspective on which Federal agency should take the lead in meeting that need.

I will read the research subjects, where more than half of the States agree that a particular Federal agency should take responsibility. The first one, Mr. Williamson has mentioned, that in Nebraska the aquifer mapping is carried out by the State, but the ASIWPCA survey shows that fifty-eight percent of the States think USGS should be a lead Federal agency to carry out that research.

Sampling protocols, behavior of pollutants in groundwater and development of groundwater clean-up technologies, the majority of the States agreed, should be carried out by EPA. Research concerning general groundwater flow, the majority felt, should be carried out by USGS. Research regarding risk assessment, pesticide application practices and technology transfer, the majority of the States agreed, should be done by EPA. I think with the Federal Government carrying out these kinds of activities, that yes, the States are in a position to——

Senator Heinz. Do the States have the money and additional management and technical expertise to follow through after that?

Mr. Johnson. Money is always a problem and that would vary from State to State, of course. I guess I am not in a good position to answer that on behalf of the Council. But in a general sense, I think the answer is yes.

Senator Heinz. Your testimony, as I understand it, outlines the existing State role in groundwater protection, State plans, agency programs and so forth. Now, I am curious to know to what extent those needs are now being met and specifically, are the Federal agencies that are relevant here cognizant of State plans and programs in groundwater and are those plans and programs respected in the development of Federal policy?

Mr. Johnson. I think that varies, again, from State to State and not being a State program manager, I cannot tell you "yes, in my case they do or no, they do not." I think that certainly better cooperation and coordination is needed. That general statement is true. There may be, in some instances, a State where very good coordination and awareness exists, but as a general matter, I think that there could be better awareness by Federal agencies. There should be better awareness.

Senator HEINZ. Mr. Williamson, do you have any comment on that?

Mr. WILLIAMSON. I will comment on the State of Nebraska. We have twenty-four natural resources districts, each of them have a groundwater management plan required by law. Just yesterday, I had a meeting with Federal agencies and I found a lack on our part, in the State of Nebraska, not fully advising Federal agencies of those and they will now have them and we will have a good coordination effort going on at the State level. So, it really comes two ways and they are all very aware that there cannot be an overlap of activities.

Senator HEINZ. Mr. Johnson, you mentioned also in your testimony the implementation of a good neighbor policy by Federal agencies. What specifically would you suggest be done to achieve that kind of neighborliness and, I assume, coordination?

Mr. JOHNSON. Well, as I mentioned and as you all know, the majority of the land in the West is Federally owned and we have coined that "good neighbor" phrase to mean that the Federal Government should comply with its own laws and statutes and should comply with those of State governments. In some cases, this has not been the case.

With regard to S. 1992, this might be done by having the interagency committee on groundwater protection envisioned in the bill specifically review the activities of its member agencies to assure that they are in compliance with State and Federal law and, possibly, to include in the annual report, any institutions or Federal reservations—and by that, I do not mean Indian reservations specifically—I mean any Federal reserves that are out of compliance. That might be mentioned in the annual report.

Further, I would reiterate that all Federal actions should be carefully coordinated with State groundwater allocation programs and hence, although it is implicit that the advisory committee mentioned in S. 1992 could request such information from the interagency committee, it might be appropriate to expand the stated purpose of the advisory committee to include groundwater quantity or allocation concerns, so that it might assure that Federal agencies respect and abide by State groundwater allocation laws.

Senator HEINZ. Could you expand briefly on the information you have compiled regarding groundwater contamination problems on Federal land?

Mr. JOHNSON. Yes, I would be happy to. I have included with my testimony a list of information which has been provided to the Council staff by State environmental officials in Arizona, California, Colorado, Idaho, Nevada, North Dakota, Oregon, Utah and Washington. It illustrates some groundwater contamination problems in the West [1] which are the results of Federal activity. It is not exhaustive. It simply is an illustrative list.

Many of the contamination problems have been caused at Defense-related facilities, but Department of Energy, Agriculture and Interior sites are also on the list. Some of the contamination has occurred in relatively isolated areas, but in other cases, the contamination sites are adjacent to major population centers, such as Denver, Phoenix and Tacoma.

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[1] See p. 102.

The list includes some very heavily polluted areas, such as the Department of Energy's Hanford Reservation in Eastern Washington and the Rocky Mountain Arsenal, which is adjacent to Denver, Colorado, which is one of the most polluted sites in the Nation.

Senator HEINZ. Let me ask either one of you, as you see fit here, regarding the legislation and the interagency committee that we establish. Should we use the interagency committee to provide some kind of single point of contact for State needs through the advisory committee or through other channels in addition to the advisory committee?

Mr. WILLIAMSON. My thought on that is, the interagency committee, the coordination effort is an excellent role. However, I do not see a real big problem with the single point of contact activity. State water managers recognize which Federal agency they need to go to for information they need, whether it be the USGS or the Bureau of Reclamation.

We know their programs. We work with them all the time. We do not have a problem with that. Now, maybe some States do. I think the total coordination effort of the committee is the key thing here.

Mr. JOHNSON. I would agree.

Senator HEINZ. You would agree with that?

Mr. JOHNSON. Yes.

Senator HEINZ. That completes my questions. Let me ask Senator Sasser's staff if there are any questions that they would like me to either ask or submit for the record.

Gentlemen, I have no further questions. I commend and thank you both for being here. I do understand that Senator Sasser may submit some questions for the record to you and with that, I pronounce the hearing adjourned. Thank you, gentlemen, very much.

[Whereupon, at 11:35 a.m., the Subcommittee adjourned, subject to the call of the Chair.]

PROTECTING OUR NATION'S GROUNDWATER: THE NEED FOR BETTER PROGRAM COORDINATION

WEDNESDAY, MAY 18, 1988

U.S. Senate,
Subcommittee on Government Efficiency,
Federalism, and the District of Columbia,
Committee on Governmental Affairs,
Washington, DC.

The Subcommittee met, pursuant to notice, at 10:10 a.m., in room SD-342, Dirksen Senate Office Building, Hon. James R. Sasser, Chairman of the Subcommittee, presiding.

Present: Senators Sasser and Heinz.

OPENING STATEMENT OF SENATOR SASSER

Senator **Sasser**. The Subcommittee on Government Efficiency, Federalism, and the District of Columbia is now called to order. I want to say good morning to our witnesses here this morning.

Today, the Subcommittee holds its second hearing on S. 1992, a bill I have co-sponsored along with Senators Heinz, Roth, and Riegle. This bill is designed to make our Nation's groundwater management program more streamlined and more effective by eliminating unnecessary duplication among Federal groundwater protection programs and by enhancing intergovernmental cooperation among Federal, State, and local governments in combatting groundwater pollution.

Now, make no mistake about it. Groundwater pollution is a problem and it is a problem that is becoming more serious. Groundwater accounts for over half of the drinking water in this country and some of our major cities and a great preponderance of isolated rural communities rely on groundwater as their sole source of drinking water.

For example, the several million inhabitants of Nassau and Suffolk Counties rely on one groundwater source for their drinking water, as do 800,000 residents of Memphis, Tennessee. Memphis, Tennessee is the largest city in the country that relies totally on groundwater for all of its public and private water needs.

So, once we pass the point of no return and seriously pollute a groundwater source, we are adversely affecting a locality for many years to come. Also over time, as the chart[1] on my left indicates, we are using more and more of our groundwater for a wide variety of public and private purposes. As the red or top line indicates, total groundwater withdrawals have risen dramatically over the years, growing from less than thirty-five billion gallons per day in 1950 to over seventy-five billion gallons per day in 1985.

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[1] See p. 297.

Now, as is readily apparent from the chart prepared by the U.S. Geological Survey, the relative proportion of groundwater used for irrigation has increased most noticeably in the last thirty years. As we use more and more groundwater, we run the risk of drying up our water resources and making them more vulnerable to pollution from a variety of sources.

Now, as the opposite illustration shows, groundwater pollution can occur in a number of ways. It can occur in run-off from surface mines; from spills; from leaks of chemicals or other hazardous waste or from waste disposal ponds or from solid waste dumps; and agricultural run-off.

In the Subcommittee's first hearing, which we held slightly over two weeks ago on the groundwater legislation we are seeking to introduce, we heard that currently the Nation's Federal groundwater management and protection program is the result of the accumulation of many years of ad hoc legislation.

The national program is therefore diffuse and uncoordinated at the present time. There is a substantial overlap and unnecessary duplication among programs, regulations and guidelines. There are significant gaps and inconsistent policies within the Federal Government. There also is a substantial failure to coordinate groundwater pollution control efforts, both within the Federal Government itself and among the various Federal, State and local governments.

The legislation that we are examining this morning, S. 1992, offers a simple and yet effective means of remedying this situation by mandating that Federal groundwater agencies meet on a regular basis to discuss their groundwater activities and iron out regulatory and administrative complaints.

This order of regular, formal, mandatory meetings is critical in order to insure that a more coherent scheme for managing our irreplaceable groundwater resource can be put in place as soon as possible.

The current Administration's view, I am sorry to say, is that coordination is already being undertaken on an informal basis as a result of the various memoranda of understanding and ad hoc groups. Unhappily, the Administration has expressed reservations about S. 1992, but these reservations, I would note, are not shared by various industry and environmental groups. We will hear from some of those groups here this morning.

But as those of you who attended our first hearing have heard and will hear today, the Administration's informal coordination process simply is not working. The Administration has been virtually at a standstill in the development of a meaningful national groundwater policy now for almost eight years. It has been stated in testimony before this Subcommittee that legislation such as S. 1992 is necessary to insure that groundwater protection will be made a national priority for now and in the future.

To reiterate, groundwater is vital. It is a life-sustaining resource for which there is no substitute. Once contaminated, it is virtually impossible to clean without substantial expense and effort and we know that there is groundwater pollution occurring in all of our fifty States, that it is increasing and that the effects may be devastating for years to come.

In the case of groundwater management and pollution control, truly an ounce of prevention is worth a pound of cure. We may not have enough available funds in this country to clean up the groundwater pollution that already exists. So it is essential that the Federal Government fully coordinate their technical resources on groundwater management and insure that the Federal groundwater agencies work with State and local governments in a coherent and effective manner.

We will begin this morning with our first panel, which will be composed of representatives of industry, agriculture and a major private sector consultant to the Environmental Protection Agency. I welcome all of you here today. We are beginning with Mr. Donald V. Feliciano, Associate, Booz-Allen and Hamilton. Mr. Feliciano, if you would come forward.

Mr. Feliciano, we are delighted to have you here. Mr. Feliciano was formerly with the Congressional Research Service. He will be joined by Mr. Alan P. Egler, a consultant with Dupont, who will be testifying on behalf of the Chemical Manufacturers Association; Mr. Bruce R. Leavitt, a hydrogeologist with the Consolidation Coal Company, who will be testifying on behalf of the American Mining Congress; and Mr. Mark A. Maslyn, the Assistant Director of the National Affairs Division for the American Farm Bureau.

Mr. Feliciano, why don't you begin, please.

TESTIMONY OF DONALD V. FELICIANO, ASSOCIATE, BOOZ-ALLEN AND HAMILTON, INC., FORMERLY WITH THE CONGRESSIONAL RESEARCH SERVICE

Mr. **Feliciano**. Thank you, Senator. I would like to thank the Chairman and members of the Subcommittee for the privilege of presenting testimony on S. 1992. It is my belief that how the Nation addresses groundwater policy within the next few years will impact directly on the quality of drinking water in the United States in the next century.

Before I begin, I wish to point out that my firm, Booz-Allen and Hamilton, currently is under contract to the EPA Office of Groundwater Protection. In that context, I have provided support to the Director of OGWP toward the consideration of national groundwater protection policies and legislation. Although I am not engaging in any policy development activity for OGWP at this time, I would be reluctant to respond to questions that would ask me to compromise the client/consultant relationship.

Nevertheless, I will try to answer your questions to the best of my professional abilities. My comments today are my own views and do not reflect those of Booz-Allen and Hamilton or the Environmental Protection Agency. I would ask that my written testimony be made part of the record.[1]

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[1] See p. 118.

Senator SASSER. Your testimony will be made a part of the record.

Mr. FELICIANO. I support the intent of S. 1992. In view of the fact that passage of national groundwater legislation is a long way off, I am in favor of any effort to improve the Federal/State role and interaction in groundwater protection and policy development at this time. What Senator Heinz and you are advocating is simply a mechanism for getting everybody in the same room and talking about the same subject—groundwater protection.

I am sorry that such interaction would have to be mandatory, but experience has shown that voluntary efforts at interagency and intergovernmental cooperation have not worked effectively.

My only recommendations are that the proposed legislation include a statement of Congressional findings that make such legislation necessary, and expanding the intent of the Interagency Committee's role to include the development and dissemination of groundwater protection information to State and local governments and the public.

In a time of an enormous Federal deficit and dwindling Federal aid to the States, at the very least the Federal Government must consolidate its expertise on groundwater protection and pass on useful information to State and local governments and the public on how they can manage groundwater protection.

Information need not be only technical for use by regulators; practical information for the public also will do much to protect groundwater. In this context, I would support the inclusion of public representatives on the Advisory Committee. My specific comments on the legislation are provided in Appendix I of my written testimony and my responses to the Subcommittee's questions are in Appendix II of that testimony.

For the balance of my presentation, I would like to give you a perspective of why I believe that legislation such as S. 1992 is needed. Considering that our national understanding of groundwater contamination was rather limited prior to 1980, I believe that great strides have been taken at the Federal, State, and local level toward protecting groundwater in the last eight years.

Nevertheless, because we have been forced into a policy-making role of reacting to the problem of groundwater contamination after the fact, I do not see the Nation coming to grips with an effective national groundwater protection policy for a long time in the absence of a well-organized and pro-active effort at the Federal level.

I, too, support the view that the States are in the best management position to protect groundwater. I will go even one step further and say that local governments probably can do much of the actual protection of groundwater, with proper State and Federal guidance. Groundwater quality, behavior and contamination are extremely localized phenomena, and it makes little sense for regulators in Washington to be telling the people of Tennessee or Pennsylvania or the people of northern New Jersey and southern New Jersey how to protect their groundwater, in view of the different groundwater conditions at each location. For groundwater contamination, it is a locally caused problem that can best be managed through a localized remedy.

However, I also support a strong leadership role by the Federal Government in establishing basic principles for protecting groundwater and in providing oral and written guidance to State and local governments for hands-on management of groundwater protection.

In short, let the Federal Government set the baselines for protecting groundwater, but leave it up to the State and local governments to decide how they achieve that protection. I believe that the EPA Office of Ground-water Protection, in recent years, has made a concerted effort to give the States the technical guidance they need, through the issuance of numerous documents.

One of the things about environmental protection in general, and groundwater protection in particular, that has always amazed me is what I call the "Us and Them" attitude. I have witnessed friction among Federal agencies and Congress, between individual Federal agencies, among individual offices within a single Federal agency, among Federal agencies and the States, and among Federal and State agencies and those they all work for—the American people.

I think that sometimes we forget that we are all working toward the same goal—to protect groundwater—and I attribute this to a lack of coordination by all parties. Let me give just one illustration.

A key element of any groundwater protection effort is groundwater protection standards. In the context of environmental protection, "standards" are most often used to define an acceptable result of compliance with a regulation. They define the specific behavior, performance or related state of nature that is expected to follow from compliance with that regulation. For groundwater, standards can serve as the basis for prevention or cleanup of contamination.

EPA has no uniform standards for protecting groundwater. The Office of Drinking Water applies maximum contaminant levels to all public water supplies under the Safe Drinking Water Act. The Office of Solid Waste uses technology-based standards and also permits the use of less stringent alternate concentration levels at certain facilities.

The Office of Emergency and Remedial Response must consider, by law, stringent maximum contaminant level goals for Superfund cleanups, although it is proposing to use the less stringent maximum contaminant levels. The Office of Pesticides and Toxic Substances currently uses risk/benefit calculations and, under a new proposal, intends to use maximum contaminant levels or, if none exist, maximum contaminant level goals, de minimis standards and ecologically based protection criteria as necessary.

Although the Agency seems to be moving toward accepting the maximum contaminant level as its groundwater protection standard, no clear Agency consensus has emerged. Last year, the debate over a national groundwater protection standard was raised to the interagency level involving some twelve Federal agency offices with interest in groundwater.

Although you may hear testimony that there already is an interagency committee on national groundwater protection policy, in my opinion, this group was little more than an ad hoc task force for developing an Administration position for supporting national groundwater legislation, which would have included the establishment of a groundwater protection standard.

To the best of my knowledge, this interagency committee has met only four times and has not been active since December 1987. The committee also has not come to any consensus on national groundwater legislation or protection standards.

Therefore, if you are interested in the result of the lack of Federal coordination on groundwater protection, you have just to look at the issue of groundwater protection standards. There is no consensus across EPA's different programs, nor is there a consensus across the Federal Government. The question then emerges, what kind of direction does this give to the States in their efforts to protect groundwater?

The answer to this question is provided in the February 1988 report by the General Accounting Office in its study of State activities against groundwater contamination. GAO found that 41 States have had to develop groundwater protection standards on their own and 16 States and territories have none. Except for the State standards that follow the Federal drinking water standards, there is little uniformity or consistency across the States. No two States have the same set of numeric standards, because of State-specific conditions, yet most of the States have called for interstate consistency.

GAO observed that, with potentially thousands of unregulated contaminants, there is considerable uncertainty about the extent to which groundwater is protected in the United States. Aside from inconsistent signals from the Federal Government, the States have another hurdle to developing groundwater protection standards—lack of resources.

For lack of funds, States do not usually conduct their own research on the toxicology of contaminants or on the risks of groundwater contaminants to health. They rely instead on information from the Federal Government. When it is not available, as is often the case, they must develop their own information, but this is duplicative when standards are developed for the same contaminant by more than one State.

In short, Mr. Chairman, I think we need systematic coordination of Federal and State groundwater protection activities and policymaking—and I think we need it badly. The Federal Government has to move beyond its current disjointed activities—which have bred antagonism, turf battles, and secrecy—maximize its efforts and resources to protect groundwater, and share this expertise and information with State and local governments. After all, we are all in this together.

Mr. Chairman, that concludes my testimony and I will be happy to answer any questions you may have.

Senator SASSER. Well, thank you very much. We will return to you later for questions. We will turn now to Mr. Alan Egler, representing the Chemical Manufacturers Association.

TESTIMONY OF ALAN P. EGLER, HYDROGEOLOGIST, DU PONT, FOR THE CHEMICAL MANUFACTURERS ASSOCIATION [1]

Mr. EGLER. Thank you, Mr. Chairman. I am a hydrogeologist with the Du Pont Company and the leader of the Chemical Manufacturers Association Groundwater Management Task Group. I am here today on behalf of CMA to talk about groundwater and our ideas about the Federal and State roles in groundwater management.

There is no question that groundwater is a vital, natural resource governed by a complex set of scientific principles. As a result, understanding these principles is critical to protecting and managing it for the benefit of its many users. The key to our understanding these principles is the availability of valid and relevant data.

Many States have recognized the need to manage their groundwater in a comprehensive fashion. Such comprehensive State groundwater programs should include certain components. For example, an appropriate management program might include resource characterization, establishment and application of groundwater quality standards, monitoring and protection from potential contaminant sources and remediation of already contaminated groundwater.

This comprehensive approach requires a significant commitment of financial and technical resources aimed at developing the necessary, valid and relevant data. Many States, unfortunately, lack such resources to varying degrees. This is where the Federal role becomes so important. Federal agencies like the U.S. Geological Survey, Environmental Protection Agency, Soil Conservation Service, several others, are well-positioned to provide supplemental, technical resources to the States.

Since even Federal resources are limited, however, it is important that the activities of the various Federal agencies complement one another, rather than duplicate or even conflict. S. 1992, a bill to promote intergovernmental and interagency cooperation in the development of groundwater policy, is designed to accomplish this.

When considering future directions, we must appreciate that there are already a number of environmental laws and an ever-expanding set of regulations affecting groundwater. Some of these regulations treat groundwater protection differently and some conflict with State and local programs. The EPA has recognized this problem and has a goal of coordinating those programs it controls. The Agency does not administer all the Federal programs affecting groundwater, however.

The interagency committee contemplated in S. 1992 is a step toward more effective coordination. It provides authority that transcends agency and program lines and helps assure that future inconsistencies can be eliminated. An example of where additional coordination would be beneficial is in the area of federally-delegated programs like RCRA. RCRA imposes groundwater protection schemes that sometimes fail to consider site-specific factors and conflict with existing State programs, needs and desires.

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[1] See p. 130 for Mr. Egler's prepared statement.

At a minimum, the Federal presence can stifle State creativity and result in blanket-like approaches that rely on numerical standards to protect the resource. Health-based numerical standards have their place and must be part of an integrated State program. Their most effective use, however, should be as a yard stick to measure the performance of an overall protection program since by themselves, groundwater standards provide no protection from contamination.

We believe that the States and local governments are in the best position to make decisions regarding their own groundwater. What they usually lack is one, the benefit of technical resources; two, coordinated application of Federal regulations; and three, Federal recognition of their own management programs.

S. 1992 would create an advisory committee to help address these deficiencies. Such a committee could help ensure that Federal research and activities meet the local needs so that the States may continue to exert their primacy over the resource. Earlier in my statement, I made two observations that I will re-visit briefly.

First, I said that many of our States would like to manage their groundwater in a comprehensive fashion. Second, I asserted that the key to managing the resource in this way is the availability of valid and relevant data. Data in what areas though?

First, the database on groundwater quality and resource characterization needs to be improved through more focused Federal assistance. Second, risk assessments and water quality criteria need to be made available to the States so that they can establish standards consistent with their needs. Finally, the States need the benefit of Federal research and development efforts on innovative technologies for protecting groundwater quality of remediating contamination when it makes sense.

We urge you to consider these areas of need when discussing ways to strengthen the bill. In summary, S. 1992 seems to define a most proper and effective role for the Federal Government. It is responsive to State needs, but could be strengthened without preempting their primacy and decision-making. CMA supports this bill and looks forward to continued discussions with the Subcommittee.

I would be happy to answer any questions or discuss these ideas in more detail either now or later. Thank you, Mr. Chairman.

Senator **Sasser**. Thank you very much, Mr. Egler. We will turn now to Mr. Bruce Leavitt, representing the American Mining Congress. Mr. Leavitt.

TESTIMONY OF BRUCE R. LEAVITT, HYDROGEOLOGIST, CONSOLIDATION COAL CO., FOR THE AMERICAN MINING CONGRESS

Mr. **Leavitt**. Thank you, Mr. Chairman. I also am a hydrogeologist. I work for the Environmental Quality Control Department of Consolidation Coal Company. I am also Chairman of the American Mining Congress Groundwater Task Force.

AMC is a national association of companies that produce most of the Nation's supply of metals, coal, industrial and agricultural minerals. AMC is pleased to have this opportunity to express its views on the vital subject of groundwater protection. Included with this testimony, as attachments, are our responses to the Committee's questionnaire. We have also included three groundwater white papers entitled, "Mining and Ground Water", "Ground-Water Management: Federal and State Roles", and "Ground-Water Management: Nondegradation Versus Management for Multiple Use".

In addition, we have included a legal memorandum regarding Federal versus State regulations of groundwater quality. I request that my statement, including these attachments, be printed in the record.[1]

Senator SASSER. It will be included in the record, Mr. Leavitt.

Mr. LEAVITT. Thank you, Mr. Chairman.

The American Mining Congress believes that judicious groundwater protection is vital to the health of our citizens and our economy. It is the judicious aspect of groundwater protection that I wish to address today. Judicious protection and management of the groundwater resource should encompass the following principles.

Both Federal and State governments have legitimate roles to play in the protection of groundwater. The roles should not be identical, but should be synergistic. For a variety of reasons which are articulated in the attached AMC groundwater white papers, the States should have the primary responsibility for managing and protecting groundwater with the Federal Government providing financial and technical support.

Comprehensive Federal legislation is not needed to protect groundwater. Sufficient protection authority exists in Federal statutes and additional protection is emerging in the developing State programs. What is needed is wise and efficient implementation of existing statutory authority.

No one Federal agency possesses all the expertise and authority for groundwater protection. Several different Federal agencies have responsibilities and legitimate roles to play in groundwater protection. There is need, however, for coordination among Federal agencies and between the Federal and State governments on groundwater matters to increase efficiency, reduce conflicting policies and eliminate duplication and overlap.

S. 1992 is consistent with these principles and therefore AMC supports it. Specifically, the bill is consonant with the roles that the Federal Government and States should play in groundwater protection. Creating an advisory committee of State and local representatives recognizes the key role States have in protecting groundwater. The interagency committee should enhance the Federal Government's role of providing the States with technical assistance, information, and research and development program support.

Also, the bill correctly avoids creating a new Federal regulatory program. Instead, it seeks to improve the implementation of existing statutory authority relating to groundwater protection. Finally, the bill provides a straight-forward mechanism and procedure for interagency coordination and elimination of duplication among Federal programs.

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[1] See p. 135.

There is a need for this legislation. Many examples could be cited of Federal inefficiency and ineffectiveness regarding groundwater protection. For instance, the Environmental Protection Agency, the Nuclear Regulatory Commission and the Department of Energy have failed to adequately coordinate their groundwater protection efforts regarding uranium mill tailings.

The Uranium Mill Tailings Radiation Control Act gives NRC authority for groundwater protection at active mill tailing sites in accordance with EPA-established standards. The Act gives DOE authority for cleanup and groundwater protection at inactive sites, also in accordance with EPA standards. Although inactive and active sites are indistinguishable with respect to potential effects on groundwater, EPA set different standards for each under the Mill Tailings Act.

Subsequently, EPA promulgated a second groundwater regulatory program for uranium mill tailings under authority of the Clean Air Act, which fully overlaps and duplicates the NRC regime and creates a serious conflict between the two agencies. EPA issued this second program because it disagrees with certain aspects of NRC's implementation of the Mill Tailings Act, even though NRC was acting clearly within its statutory authority.

A bill such as S. 1992 provides the forum for these three agencies to resolve their differences and coordinate their efforts in implementing their statutory authority for groundwater protection at uranium mill tailings sites. A lack of coordination also exists with respect to existing Federal databases on groundwater. This hinders good decision-making. In order to make a careful decision with respect to a particular site, all of the various databases must be searched.

Under the current structure, considerable effort must be expended to obtain all existing data. Coordination is required among the Federal agencies in order to create a unified database that is easily accessible and contains all the relevant information. This will eliminate the need for existing data to be re-compiled each time it is used.

Creating one comprehensive database is an enormous undertaking that the Federal Government is best equipped to undertake. S. 1992 provides a mechanism for working towards this goal, which can be achieved through sustained interagency coordination and effort.

Other examples of government inefficiency and confusion concerning groundwater are described in our response to the Committee's questionnaire. Individually and collectively, they point to the need for increased coordination among Federal agencies and between Federal and State governments—a goal, S. 1992, can help achieve.

The AMC looks forward to working with the Committee on this legislation and I will be pleased to respond to any of your questions.

Senator SASSER. Thank you very much, Mr. Leavitt. We will turn now to Mr. Mark Maslyn, representing the American Farm Bureau. Welcome, Mr. Maslyn. We look forward to your comments.

TESTIMONY OF MARK A. MASLYN, ASSISTANT DIRECTOR OF NATIONAL AFFAIRS DIVISION, AMERICAN FARM BUREAU

Mr. MASLYN. Thank you, Senator. On behalf of the Farm Bureau, I want to thank you for the opportunity to appear here today to speak to the issue of groundwater protection and S. 1992, in particular. I will summarize my remarks and ask that the entire statement be included in the record.[1]

The issue of groundwater is not new to the Farm Bureau. In fact, we have had member-derived policy for more than ten years. In addition, we have taken many steps to inform and educate our members about the issue through numerous articles, publications, as well as hundreds of conferences, workshops, meetings. Last year, we published an environmental check-list and an environmental audit to assist farmers and farm families on the farms in their daily activities. I know that the Tennessee and Pennsylvania Farm Bureaus have incorporated this widely in their country Farm Bureau programs.

In addition to the environmental check-list, we have helped thousands of Farm Bureau members to test their own wells for possible contaminants and we are actively encouraging every country Farm Bureau to adopt and promote the well testing program.

Mr. Chairman, I want to commend you and Senator Heinz and Senator Roth for sponsoring this legislation. Establishing a mechanism to promote intergovernmental and interagency communication and cooperation is an essential first step in attempting to address an issue as complex and diverse as groundwater efficiently and effectively. Perhaps even more important, from our point of view, is that it recognizes that State and local governments have a major role in the protection of groundwater.

The Farm Bureau believes that the site-specific, soil-specific nature of the problem requires a strong primary role for State governments. From our point of view, Federal groundwater legislation must be premised with a goal of preserving family farming as a viable entity. Accordingly, it must understand the vital role that agricultural chemicals play in modern farming and it must be responsive to the concerns of private property owners.

Related to that, I have one overall recommendation concerning the legislation before us today. That is to give a higher profile to the Department of Agriculture. While it probably comes as no surprise to have the Farm Bureau feel that way, there is good reason behind it. We have long believed that any Federal groundwater legislation should recognize the USDA as a full and equal partner with substantive and defined responsibilities.

The Soil Conservation Service, the Agricultural Stabilization and Conservation Service, the Agricultural Research Service, the Cooperative State Research Service and the Extension Service all have outstanding technical, scientific, data collection and outreach capability in the soil and water area that should be utilized.

In short, they have the expertise and the site-specific, soil-specific knowledge necessary to make sound decisions. Because of this capability, I would urge you to consider making the Secretary of Agriculture a co-chair of the interagency committee.

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[1] See p. 166.

Beyond the previous suggestion, I have a number of specific questions about S. 1992 that I would draw to your attention. Section 2(b)(2) outlines the duties of the interagency committee. While authorized to identify and eliminate duplications and overlap between or among programs of member agencies, it is not clear how that would be accomplished. Who defers and how would conflict be resolved, particularly when popular programs are involved?

Continuing in this section, subparagraph (D) speaks to the development of overall priorities and a coordinated plan for addressing State technical assistance, information and research needs. I would again remind you of the role that USDA-related agencies could play because of their hands-on expertise and familiarity with local needs. I would also urge the same consideration in efforts to carry out the duties mentioned in subparagraph (E).

Section (2)(c) addresses the role of the advisory committee. The section allows for the appointment of not more than eleven individuals representing State and local governments. Once again, I believe it would be productive to expand the committee, if necessary, to include representatives of ASCS, SCS, the Extension Service, the Land Grant Universities and the State Geologist. These are people who are working with the programs in the field who could provide valuable insight.

One further suggestion would be to have the advisory committee conduct public meetings with affected interests, such as the farm community, to seek input on research and information needs and other improvements to the program.

In conclusion, we support the intent of your legislation. It is an essential first step in dealing with an issue like groundwater, with so many jurisdictional claims, that we begin to coordinate the many Federal and State activities. We have also sought to establish the notion that the farm and ranch community, absent a clear and consistent Federal groundwater policy, is concerned and has initiated training, testing, education and information programs on its own.

We look forward to working with you on this legislation and are anxious to assist you in any way we can. We appreciate your consideration of our views.

Senator SASSER. Thank you very much, Mr. Maslyn. Mr. Feliciano, in your experience, if an ordinary citizen wants to get information on groundwater from the Federal Government, what kind of information can he or she get and how easy is it to get the information?

Mr. FELICIANO. The Environmental Protection Agency has a public information phone number you can use. The EPA also has a hot line with an 800 area code number for safe drinking water. I do not think these are well-known around the country. If you do get through to EPA, there are a number of pamphlets and brochures you can get.

Two of the largest causes of groundwater contamination in the country are malfunctioning septic systems and leaking underground storage tanks and in at least those two categories, the Office of Ground-Water Protection and the Office of Underground

Storage Tanks have put together actually several documents on those issues.

Several States have very good groundwater information that is available to the public. States like Florida, Wisconsin, and Maine come to mind on those.

Senator **Sasser**. In your opinion, have the efforts to coordinate groundwater problems within the Federal Government in the past eight years been very effective?

Mr. **Feliciano**. Have they been effective?

Senator **Sasser**. Have the various efforts on the part of the Federal Government to coordinate the agencies over the past eight years been as effective as it should have been? In other words, the Administration is taking the position that there is coordination among the Federal agencies now on an ad hoc basis and that it is effective in getting the job done.

My question to you is, how effective is it? Is it indeed getting the job done?

Mr. **Feliciano**. Well, they are kind of in a tough position. The fact is that there were several environmental programs at EPA that had developed their protection policies long before groundwater became the hot issue. So, in that context, EPA, USGS, and the Federal Government have had to play very much a catch-up role where they had to bring groundwater into the decision-making process, and then try to integrate groundwater protection concerns into already-existing programs and policies.

It has not been easy for them. I think they have made good strides, but you have to remember, there was not even a Groundwater Office at EPA prior to 1984. So, we are only talking within the last four years. I think they have come out with some important documents and programs. That is all that office can do at the Agency.

They have put out documents on wellhead protection in response to Congressional mandate in the 1986 Safe Drinking Water Act amendments, and at the very least, they have certainly put in the minds of everybody in the States that they should be monitoring groundwater and reporting regularly to the Federal Government about the conditions that exist out there.

So, I think it is a positive step, but I think we are going to be playing catch-up for easily the next ten years.

Senator **Sasser**. In other words, you are saying we have made some progress, but we have still got a long way to go? Is that how I interpret your answer?

Mr. **Feliciano**. Sure. We can always wish they had done more, but I think within the context of them playing catch-up, they have not done too badly.

Senator **Sasser**. Yes.

Mr. **Feliciano**. But certainly, I think with the conditions we are dealing with, they have to do the utmost to coordinate their efforts.

Senator **Sasser**. Mr. Egler, let me ask you this question. I understand that there are different techniques for analyzing a water sample for contaminants. The Environmental Protection Agency uses two different techniques and the U.S. Geological Survey uses a slightly different method, as I understand it, from either of the two techniques that the EPA uses.

How does this sort of contradictory methodology affect the industry or affect industry? Are you familiar with this whole business?

Mr. **Egler**. Yes, I am, Senator. I think it certainly burdens the regulated community, the industry, with a lot of uncertainty. We are talking about different analytical techniques that at least in theory are designed to arrive at the same number, the same concentration of chemicals being analyzed. However, there are different protocols being employed and it is not always clear that the same bottom line number is being arrived at.

There is some overlap in which contaminants are addressed by which protocols, but there are a lot that one set of protocols does not address whereas, the first set does. So, I think more than anything, it just saddles us with a lot of uncertainty You are never quite sure whether the data is valid.

Now, if you assume that everything is done correctly and that the proper technique is used, then in theory, you get a good number. But the uncertainty makes the existence of all these different analytical techniques and the lack of uniformity very difficult to deal with.

Senator **Sasser**. We have been joined by the distinguished ranking member of the Subcommittee, Senator Heinz, who is a co-sponsor of this legislation and has played a leading role, I think, in alerting the Nation to the problems affecting groundwater contamination. I would like to defer now to Senator Heinz for any questions or comments he might wish to make.

Senator **Heinz**. Mr. Chairman, thank you very much. Let me, at the outset, apologize for not being here at 10 with the beginning of the panel.

Senator **Sasser**. Just let me say that if you had been here at 10, Senator Heinz, you would have been early because the Chairman was unavoidably about ten minutes late.

Senator **Heinz**. We had a mark-up—and it is still going on—on the Canadian Free Trade Agreement in the Senate Finance Committee. I had one or two amendments that I had to raise and that is why I was delayed.

Let me ask further, if I might, that my opening statement be made a part of the record.

Senator **Sasser**. It will be made a part of the record.

[The statement of Senator Heinz follows:]

OPENING STATEMENT OF SENATOR JOHN HEINZ

Mr. Chairman, thank you for holding this second day of hearings on our legislation to improve Federal coordination of groundwater management, and to provide State and local governments the access they need to Federal policy making.

Groundwater is our lifeblood. Over 100 million Americans depend upon this resource for some or all of their drinking water. Virtually every aspect of modern life impacts groundwater quality, and the groundwater protection requires the attention of every level of government.

State and local government need our help, in setting standards, drafting State plans, accessing information, conducting research, and finding appropriate technologies to protect and manage groundwater resources. Without a coordinated Federal effort, these governments must run the gamut of Federal agencies, hoping to meet their needs. Many must quite literally re-invent the wheel.

Our legislation, S. 1992, will change that.

Today's witnesses will address the role of the Federal Government in developing groundwater management and protection strategies. We have found that there is no overall direction to Federal efforts, that coordination efforts are fragmented among different interagency groups, and that State and local governments, until very recently, had only themselves to rely upon. As a result, 41 States have had to develop their own groundwater protection standards, of which no two States have the same, 16 State governments and territories have yet to adopt any strategy, and my own State of Pennsylvania has had its groundwater plans delayed as it has sought to draft plans from scratch. Pennsylvania currently operates on a program-to-program basis, using different groundwater quality standards, as it waits for Federal leadership in establishing a uniform standard. Countless State funds may have been misused, if not entirely wasted, in attempting to iron out inconsistencies between these separate standards. State officials have indicated that much more comprehensive Federal leadership is needed for them to truly begin addressing the problem of groundwater contamination, and that they are not aware of any timeline to which the Environmental Protection Agency may be adhering to establish a uniform standard.

Until recently, the Office of Management and Budget had a task force to coordinate the development of Federal groundwater policy among the Department of the Interior, the USDA, the EPA, and the Department of Energy, and others. That committee met only four times, has not met since last December, and may not even exist anymore. The administration's witnesses will claim that a subcommittee of the Committee of Earth Sciences of the Federal Coordination Committee on Science, Engineering, and Technology, is somehow going to carry out the complex job which S. 1992 would assign to a interagency committee. The Committee on Earth Sciences does not have groundwater protection as its primary goal, is not made up of the appropriate agency heads, and has little say over policy development. It is geared instead toward research findings. The OMB task force, I am told, did not effectively resolve interagency conflicts, or come up with a national groundwater policy, or protection standards for that matter. I have similar doubts about the potential for success of this new subcommittee on groundwater.

So we need to face with facts: There is no entity to coordinate groundwater management; there is no method by which State and local governments can access the information and the research they need. Data from USGS and from EPA is seldom on geo-based software, and thus, cannot be cross-referenced. Data collecting from different agencies uses different parameters, and valuable knowledge is lost because of bureaucratic indifference to State and local needs.

EPA has a groundwater strategy, developed between 1979 and 1984. It has not been adopted as a Federal strategy. It has not been updated, nor am I aware of any significant review of that strategy in recent years. In fact, it is not universally regarded even at EPA. EPA has memoranda of understanding with most Federal agencies that manage groundwater, but those have never been updated or reviewed.

The USGS has an Office of Water Data Management, which is supposed to coordinate groundwater data collection and dissemination. It is not being properly used. USGS data is extremely valuable, but is usually in a format which is of little or no value to State and local governments.

So for someone to say there is no problem—that all policy is coordinated—that person is going to have to answer these questions. I want to welcome today Bruce Leavitt of Pittsburgh, and Eric Draper who is formerly of Pittsburgh, before the subcommittee.

We have, overall, an outstanding group of witnesses, and I want to welcome them here today. Finally, Mr. Chairman, I want to express my appreciation to you for all your work to bring these hearings about. Thank you, very much.

Senator HEINZ. Mr. Chairman, I also hope that in asking any questions of the panel, I do not go over any ground that you have already covered. I think perhaps I will avoid doing that, but I cannot be sure. I must say that I am delighted to see some people from my home State of Pennsylvania here as well as all of you experts.

Let me ask Mr. Feliciano, who has the unique perspective of having been a consultant to the Environmental Protection Agency, about something the Administration will apparently testify to when we hear from them. And that is, that the FCCSET Subcommittee on Groundwater, which has apparently superseded the Interagency Task Force on Groundwater chaired by OMB, is already doing many of the same things S. 1992 requires and would accomplish through the establishment of the interagency committee.

That is what I understand the Administration will stipulate and my concern is that the FCCSET subcommittee does not include the policy-making agency heads; it does not actually deal, insofar as I understand it, with policy matters, and it would appear to be completely isolated from State and local needs.

Are my concerns accurate and can you elaborate if they are or are not?

Mr. FELICIANO. To the best of my understanding, that committee that you are referring to is rather new. The people who are on it, that I am aware, are basically research officials. In fact, the two EPA representatives to it both work in the Office of Research and Development. So, I would categorize that committee as basically a research policy committee. No, I would not consider that to be any kind of a national policy-making committee of Federal agencies.

Senator HEINZ. And so it will not deal with, for example, the problems of different databases and different computer storage modes?

Mr. FELICIANO. I think data collection and storage are an important research function. I think in the area that you have referred to that they probably would talk about those.

Senator HEINZ. They may talk about that. Do they have any input from State or local jurisdictions?

Mr. FELICIANO. I am not aware of it, but as I said, it is a new subcommittee. I do not think State and local governments have had a very prominent role at this point.

Senator HEINZ. Let me ask, and this I probably would direct to Mr. Feliciano, too, although any of you who care to may comment on it because it does cut broadly——

The General Accounting Office found that no two States have the same groundwater standards and in your testimony, Mr. Feliciano, you cite the findings of that February 1988 study. What could, in the opinion of you or the other panelists, the Federal Government have done to avoid so much disparity in groundwater protection standards? That is question number one.

Question number two is, if we come in now some years later, when forty-one States have adopted some kind of plan, devised their own, more or less, unique standards, and establish an overall Federal strategy, will we force States to go back and rework all of their efforts? Would this be enormously duplicative?

So, two questions. For the benefit of Wednesday morning quarter-backing, what could we have done differently and better and secondly, if we do something along those lines now, how big a problem will we create for the States? Let me ask Mr. Feliciano to start and any of you others to jump in.

Mr. FELICIANO. Unfortunately, with groundwater we are very much sailing on uncharted waters and I guess you can appreciate the predicament at EPA that you have to come up with standards that you may have to defend in court someday. Generally, the Agency is reluctant to put out regulations that it does not have a real strong feeling can be defended.

On the other hand, groundwater protection standards will help everybody. Whether they are the best that you have got or not, my feeling is that you should study things and then you should do something. We can study it forever, but if you do not come up with something that the States can use as guidance, then they are forced to do it by themselves.

Nothing preempts the States, under environmental law, from making more stringent standards. If a State's drinking water standards are at least in compliance with eventual Federal groundwater protection standards, then it will not interfere with their programs at all. I know in the State of New Jersey, for example, they have more stringent standards proposed for volatile organic chemicals. Even when the Federal standards became promulgated, they will not affect the State program. In fact, the water would have to be protected to the higher, State level.

Senator **Heinz**. Would it be relevant to ask which standards, since I understand there are about four different sets?

Mr. **Feliciano**. They are volatile organic chemicals.

Senator **Heinz**. No, but are there not four different sets of standards set by four different offices within EPA?

Mr. **Feliciano**. The standards I am referring to are maximum contaminant levels set under the Safe Drinking Water Act.

Senator **Heinz**. All right.

Mr. **Feliciano**. Any of those standards could be applied at different Agency offices. It is a matter of how well they are coordinated. It is my feeling that they are not well coordinated at the Agency. Everybody is still doing things the way they have always done it.

Senator **Heinz**. Mr. Leavitt? Mr. Egler? Mr. Maslyn? Any comments on this question?

Mr. **Leavitt**. Yes, Senator, if I may. I think the question of standards really leads to the heart of groundwater protection. Mr. Egler previously testified that setting standards does not protect groundwater. Having a standard lets you know when you have failed to protect groundwater. If we focus our efforts on setting standards, we are not going to be protecting groundwater. We will be finding out where we have failed to protect groundwater.

There is a clear need for Federal health-based standards. Everybody needs to know that the water they are drinking is safe. It is either going to hurt you or it is not going to hurt you. However, if we get into the business of trying to establish what are known as ambient groundwater standards—that is, to apply a standard so that no matter where you drill a well, you can expect to find water of that quality—we are fooling ourselves because that type of a program is expensive to administer—actually, it is impossible to administer.

In a large number of cases, particularly when you are dealing with the inorganic chemicals that are naturally occurring, you will find that natural groundwater often exceeds what might be a health-based standard.

Senator **Heinz**. Very well. Let me ask you—do you have a comment, Mr. Maslyn?

Mr. **Maslyn**. I would agree with those remarks and simply say that the Farm Bureau believes that one of the essential roles of the Federal Government in the groundwater area is the setting of standards. I think we are in the situation we are now because some of the States, depending on their unique soil and water characteristics have had to respond to the groundwater problem ahead of other States.

There is a different sense of priorities from State to State and frequently, some States have had to deal with this and are further along and ahead of the curve and they have looked to the Federal Government for some assistance, some direction and found that there was not a whole lot.

So, I think they have eventually moved on their own out of self-protection. But I do not believe it is in the national interest to have forty-one different standards and I think that is one of the roles that the Federal Government could play—should play.

Senator HEINZ. Is it not a fact that some States, among them my home State of Pennsylvania, have been so confused or lacking for direction when it comes to having clear standards or goals that ought to be set for the benefit of our State, that they and others like them simply have, in effect, thrown up their hands and said, well, we are going to wait until the Federal Government sorts this out?

Mr. LEAVITT. Well, you are correct. Pennsylvania is confused. I do not believe, however, that Pennsylvania has thrown up its hands.

Senator HEINZ. No, no, wait a minute now. Those are my constituents. [Laughter.]

Mr. LEAVITT. And I am one of them.

But my experience with Pennsylvania is that they have had a very checkered history in the area of groundwater protection. Other neighboring States have done a far better job of dealing with the issue. I am fully aware that Pennsylvania intends to deal with the issue. Right at the moment, they have other environmental issues further forward on their agenda than groundwater.

I sincerely hope that Pennsylvania will become one of the leaders in the country in coordinating activities, both within the State community, as well as the local governments, but also with industrial and environmental constituents, which, sometimes in the past, they have failed to do.

Senator HEINZ. Maybe Senator Sasser asked this question. If he has, I apologize. At our earlier hearing, we received a lot of testimony as to the lack of compatibility of data gathered by different agencies with different formats and that USGS and EPA, for example, might study similar formations, but use different parameters, different softwares, different data storage systems.

How big a problem is the lack of data compatibility and software and storage compatibility? Anyone want to take a crack at that?

Mr. EGLER. I would like to take a crack at that, Senator.

Senator HEINZ. Mr. Egler.

Mr. EGLER. I think it is a major problem. Any decision involving groundwater needs to be made with all the data at hand and to have data that cannot be communicated, that cannot readily be found and used makes the decision-making process very difficult. There is no doubt about that. I think that part of the problem is the lack of communication, which is, in part, due to the difference in objectives. It is clear that the Environmental Protection Agency's objectives are different than the objectives of the U.S. Geological Survey.

But that is no reason that the data cannot be shared between those two agencies and I do not think enough of that is going on right now.

Senator **Heinz**. Well, in addition to sharing, is there any reason why it cannot be collected in a way which facilitates rather than impedes its utilization?

Mr. **Egler**. There is no reason that could not be done given the resources and the desire to do it. You are talking about taking samples in some instances from the same wells, but submitting those samples for analysis of different chemicals. That, obviously, could be corrected, but I think the resources need to be made available and the objectives need to be stated right up front.

Mr. **Feliciano**. Senator, EPA currently funds a national groundwater information center and a national groundwater information database through the National Water Well Association in Ohio. I cannot speak to the quality of the data in there, but it may be worth your while to ask the Agency to explain what kind of data they have in that database and how well it is used. It is fairly technical data for scientists, to my understanding, with very little public use.

Senator **Heinz**. All right.

Mr. **Leavitt**. If I could elaborate—that database is primarily a document search of the published literature. So, if the data has been published, there will be a title for which you can find a reference. It is not an actual print-out of raw data.

Senator **Heinz**. Very well. Well, thank you, gentlemen. Thank you, Mr. Chairman.

Senator **Sasser**. Thank you, Senator Heinz. Gentlemen, thank you very much for appearing here this morning. We appreciate your views and your testimony.

Our next panel of witnesses will consist of Ms. Marian Mlay, the Director of Groundwater Protection for the Environmental Protection Agency; Mr. Philip Cohen, the Chief Hydrologist of the U.S. Geological Survey. I would urge our witnesses—I know there are some lengthy statements—to adhere, as closely as you can, to our five-minute rule this morning.

We have some other witnesses to hear and we also have some very important legislation or business on the floor of the Senate today. We are taking up the INF Treaty and so, for that reason, we are a little cramped for time. So, why don't we begin with you, Ms. Mlay.

TESTIMONY OF MARIAN MLAY, DIRECTOR OF GROUNDWATER PROTECTION, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY JOHN SKINNER, PH.D., DIRECTOR, OFFICE OF ENVIRONMENTAL ENGINEERING AND TECHNOLOGY DEMONSTRATION

Ms. **Mlay**. Thank you very much, Senator Sasser and Senator Heinz. I am Marian Mlay, Director of the Office of Groundwater Protection. With me today is Dr. John Skinner, who is the Director of the Office of Environmental Engineering and Technology Demonstration and is responsible for coordination of groundwater research in EPA.

I would like to submit my testimony for the record and provide a summary, as you requested.[1]

Senator **Sasser**. It will be included in the record.

Ms. **Mlay**. Thank you. The Subcommittee has expressed its interest in hearing EPA's views on S. 1992. Before providing you with our specific comments, I thought it would be important to present some background on EPA's groundwater protection efforts and the Agency's perspective on coordination of groundwater at the Federal level and with the States.

Groundwater protection is one of EPA's top priorities. Many of our programs and a large percentage of our budget directly support the protection of groundwater quality. I would like to describe briefly to you the authorities that we have for protecting groundwater, the principles which EPA believes should guide our future efforts, and the efforts that we currently have to coordinate with other Federal agencies and with the States.

Many sources of groundwater contamination are already being addressed under the authority of existing Federal environmental statutes as you have heard. Briefly, they include RCRA, the Resource Conservation and Recovery Act, which puts controls on hazardous wastes; Superfund, which provides us with major authorities and resources to clean up historical and current releases of hazardous substances to the environment; FIFRA, which is a statute which enables us to control the availability and use of pesticides—many of which can contaminate groundwater; the Safe Drinking Water Act, under which we set drinking water standards commonly called MCLs, maximum contaminant levels, for water delivered at the tap and which are, in turn, used as reference points by the Agency in the groundwater quality management decisions under statutes like RCRA and Superfund and FIFRA.

We also provide substantial assistance, about twenty-seven million dollars over the past four years, to States for the development and implementation of State groundwater protection strategies. Finally, we are providing guidance and assistance to States in developing Well Head Protection Programs to protect water entering the wells or well fields of public systems.

Other Federal agencies play a major role in the management of groundwater as well. A number are land management agencies within the Department of Interior and USDA, which have oversight over certain Federal lands; agencies which manage facilities with the potential to contaminate groundwater, such as the Department of Energy and the Nuclear Regulatory Commission and Department of Defense; and finally, agencies which characterize and map the resource and conduct research, such as the U.S. Geological Survey and the Department of Agriculture.

Existing statutes, therefore, provide the Federal Government with significant authority to address groundwater protection and management in many ways. In the late 1970's—actually it was 1979 when I first got involved in this, EPA recognized that the Agency's role in the area of groundwater protection was fragmented and largely undefined. As a result, in 1984, the Agency formally adopted a groundwater protection strategy that articulated principles that should guide EPA as it set about addressing groundwater protection; and, at the same time, my office was established to implement that strategy.

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[1] See p. 195.

Administrator Lee Thomas recently noted in testimony that the principles set forth in the strategy should continue to guide our future national efforts to protect this resource. I would like to just touch upon them briefly as a context for our comments.

First, the States should continue to have the primary role in the protection of the quality of groundwater resources. Such protection invariably requires decisions about land use, including the siting of various types of facilities, as well as the allocation of water resources which are also appropriately within the purview of State and local government.

Secondly, there is an important role for Federal Government to play. We have an appropriate role in controlling the use of certain toxic chemicals of national concern, in setting protective standards for major sources of contamination, in providing technical assistance and in research and development in support of protection and clean-up activities.

The third principle is referred to at EPA as "differential protection." This has to do with how standards are applied. Differential protection means that the variability and the use, the value and the vulnerability of the groundwater resource is taken into account as decisions are made as to how to protect the quality of the resource. That is, the standards to be applied to clean-up and protection will vary from the EPA reference point, which is the drinking water standard or MCL, as conditions vary.

Closely tied to the concept of differential protection is the fourth principle that the Administrator believes should guide our future efforts. We must distinguish between prevention and corrective action in our decision-making and we must put much more emphasis on prevention. The Agency has found that it is usually much more expensive to clean up contamination, especially at low levels, than it is to prevent it. The strategy also places a major emphasis on coordination with Federal and State agencies and my office was given responsibility for promoting and implementing such coordination.

One of the underlying premises of S. 1992 is that there is a lack of coordination in Federal groundwater protection efforts which results in inappropriate duplication and overlap in responsibilities among Federal agencies. EPA strongly disagrees with this premise. Therefore, we oppose the bill.

Coordination of groundwater protection programs of Federal agencies is certainly desirable. However, there is no need for a statutorily-mandated committee designating lead agencies and creating a committee itself. The creation could result in having the committee interfere with the ability of individual agencies to carry out their statutorily-mandated missions by making procedures more complex and burdensome than they are now.

More importantly, any attempt to designate which agency, out of all Federal agencies, are leads in this regard would be detrimental and could conflict with the agencies' programs. EPA believes that it is important and appropriate to have a number of Federal agencies working on groundwater protection and, as I have pointed out, Federal statutes already require this.

The way to ensure that inappropriate duplication of effort is not taking place at the Federal level is to have agencies talking and working with each other. The President and the Federal agencies already have in place a number of existing mechanisms for appropriate coordination. One new example, as you mentioned, is the Federal Coordinating Council on Science, Engineering and Technology, known as FCCSET, which has recently established a subcommittee to provide a forum for coordinating Federal agency efforts in science and technology related to groundwater.

Other mechanisms are memoranda of understanding among the various Federal agencies. We have such memoranda with the Departments of Agriculture, Interior, Defense, Energy and others. We also have created many special, more focused staff level groups to work together so that each agency can advance its statutorily-mandated missions.

Additionally, during the development of the President's annual budget proposal, as well as through the regulatory process—operated under Executive Order 12498, entitled "Regulatory Planning Process"—the Executive Branch has extensive opportunity to review, coordinate and modify Federal programs and policies.

EPA has a large number of interagency efforts underway also. We have attached to the testimony a list summarizing these activities, which involve solely the Departments of Interior and Agriculture as an example of the kinds of the coordination activities that are underway. In fact, there are about seventy-seven separate activities that we have been able to list.

EPA has similar agreements and similar activities with Defense, Energy and other agencies. These agreements do not necessarily implement themselves, but they do take place through periodic meetings and, more importantly, through specific projects. Let me tell you about a couple of examples: one, EPA's proposed Agricultural Chemicals in Groundwater Strategy, which is now out for public comment; and, two, a USGS/EPA workshop on hydrogeologic mapping needs for groundwater protection.

The Agricultural Chemical Strategy was developed with extensive input from other Federal agencies and State and local government, as well as the private sector, over the past two years. The goal of the strategy is to better protect groundwater from agricultural chemical risks and it calls for much greater involvement of the States and the U.S. Department of Agriculture and other agencies in the effort.

Similarly, my office and Dr. Cohen's office completed last week a workshop on hydrogeologic mapping needs in which there were State representatives and local representatives. The purpose was to increase cooperation between our two agencies in mapping for groundwater protection and to try to direct this joint Federal effort toward meeting the needs of State and local government. We brought individuals from the State Geologic Surveys and from the State environmental agencies together in a structured workshop to discuss their mapping needs including such issues as what scale, and what parameters.

A different type of interagency effort which we carry out between EPA and the other Agencies is the implementation of environmental protection statutes at Federal facilities. To assure a coordinated effort between EPA programs and the Federal facilities which carry out the requirements, we have long had an Office of Federal Activities, which meets regularly, carries on extensive coordination and oversight and is involved with an ongoing exchange with all the relevant agencies, certainly including Energy and Defense.

USGS, as they will point out, has a different type of coordination activity. For example, they chair an interagency advisory committee on water data, which has a subcommittee on groundwater. That subcommittee chairmanship rotates annually and this year, a gentleman from my office is chairing the subcommittee. They work on issues such as quality assurance of groundwater data, data integrity, graphic information systems and so forth.

Coordination at the State and local levels with Federal agencies takes place primarily through EPA regional groundwater offices, which have been explicitly established as a focal point for this purpose. There are many activities listed again in the Appendix. I call to your attention one in Massachusetts entitled the "Cape Cod Aquifer Management Project", which is a cooperative effort to assess a very specific problem around the Cape Cod area to bring to that community needed data from all of the agencies involved and to help craft a solution. EPA, USGS, State and local agencies and the Department of Defense are involved in that.

Further, all States have either developed or are developing groundwater protection strategies to help implement their efforts. We fund that in part through the Clean Water Act and these strategies stress coordination among the various State agencies, as well as relevant Federal agencies. EPA regional offices are again the major point of contact with the States regarding State strategies development and implementation.

Federal and State coordination activities on an interagency and intergovernmental basis will continue to improve. A new entity does not appear to be the solution. There are unsolved problems in terms of science and technical assistance that we do not believe are addressed by this bill.

Furthermore, the Federal and State activities of the past eight years have been moving forward to accomplish increased efficiency and we strongly believe we are really on the correct path and that Federal legislation is not needed.

This concludes my testimony and Dr. Skinner and I would be happy to answer any questions you have.

Senator SASSER. Thank you very much, Ms. Mlay. We will turn now to Mr. Cohen for his testimony.

TESTIMONY OF PHILIP COHEN, CHIEF HYDROLOGIST, U.S. GEOLOGICAL SURVEY

Mr. COHEN. Thank you, Mr. Chairman. My name is Philip Cohen and I am the Chief Hydrologist of the U.S. Geological Survey. I am a groundwater geologist and I joined the Survey some thirty-two years ago after completing my formal education. We have submitted a prepared statement for the record [1] and, with your permission, I would like to spend just a few minutes summarizing that statement, then close with a few remarks regarding the groundwater situation in the United States.

Senator SASSER. Your full statement will be included in the record.

Mr. COHEN. Thank you, sir.

First, I would like to call to your attention the fact that the USGS is the Nation's largest water science and water information agency. In the present fiscal year, our water-related activities involve an in-house staff of about four thousand people and an expenditure of some two hundred and seventy million dollars of appropriated and reimbursable funds. About one hundred and ten to one hundred and twenty million dollars of that amount is earmarked for groundwater science and related information and technical assistance.

With regard to the written statement that we submitted to the Committee, the bottom line is that the Administration believes that the States should have the principal responsibility for managing both the quantity and quality of the Nation's groundwater. This mainly reflects the fact that the States, by and large, have traditionally managed groundwater quantity and are eager to assume the role of managing groundwater quality.

Further, with regard to the bill being considered by this Subcommittee, the Administration's position is that it is not needed. Coordination of groundwater issues between and among Federal agencies presently is good and continues to improve. Coordination between the USGS and some nine hundred and fifty State and local agencies which participate in our Federal/State cooperative program of water resources studies—which, incidentally, began in 1895—is an especially noteworthy element of intergovernmental coordination in the field of groundwater.

In closing, it is clear that the Nation does have groundwater problems and as a society, we need to address these problems. But I would urge that before we adopt any further large-scale regulatory programs, we accelerate our scientific efforts to document the nature and extent of groundwater problems, develop effective remediation and monitoring techniques and further refine and, if need be, develop new procedures to predict the impacts of human activities on groundwater systems.

In the short term, we will avoid the pitfalls of addressing groundwater issues in an unduly, hasty manner and in the intermediate and long term, we will solve those problems more quickly and in a more cost-effective manner.

Thank you, Mr. Chairman.

Senator SASSER. Thank you very much, Mr. Cohen. Mr. Cohen, what has been the result of the meetings with the Office of Management and Budget Task Force? I understand that the charter of your primary coordinating committee specifically excludes coordination of policy or regulation. Should this sort of coordination be going on?

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[1] See p. 258.

Mr. **Cohen**. Well, I participated only in providing staff support to Assistant Secretary Zigler on the OMB task group and the group focused primarily on groundwater research and with a great deal of interest in legislation on both sides of the Hill with regard to groundwater research. One of the steps that the task group took was to establish a subcommittee under the Federal Coordinating Council for Science, Engineering and Technology to address groundwater research and the specific decision of that sub-Cabinet level group was that the focus should be on research.

Dr. Skinner and others at my level in Government are members of that subcommittee, which is a newly established subcommittee. We have met two or three times for organizational purposes. Whether the subcommittee should or should not address policy matters reflects the position of the OMB task group—and incidentally, in addition, we are not addressing regulatory matters. We are looking at groundwater research. That was a decision made by the sub-Cabinet level group over at OMB.

Senator **Sasser**. Well, Ms. Mlay and Mr. Cohen, I will ask you both. Has the Administration testified against the several groundwater bills that have been passed in the House of Representatives and have you testified against the several groundwater bills that are pending in the Environment and Public Works Committee here in the Senate?

Ms. **Mlay**. Yes.

Senator **Sasser**.Why is the Administration opposed to any major groundwater legislation in the Congress? Given the continuing pollution of groundwater supplies and given the testimony of the industry witnesses on one side and environmental witnesses on the other side in favor of it, given the extensive hearings that have been held in both Houses that have resulted in recommendations for more forceful and coordinated approaches to groundwater policy—why in the world is the Administration opposed to it?

Ms. **Mlay**. Generally, the concern with the statutes or the bills that have been proposed is that they really do not do very much for us—H.R. 791, for example, lays out research responsibilities which the agencies currently have and are currently conducting. And so, it did not seem to be terribly useful to have another set of statutes which are duplicative of our current responsibilities.

Senator **Sasser**. That response would be more persuasive if the Administration was effectively carrying out its current responsibilities.

Ms. **Mlay**. Well, I think we all agree that there are a number of very difficult problems to resolve with respect to groundwater. The EPA has, as I enumerated, a variety of statutes which we are attempting to implement now. Many of them are quite new. There have been massive amendments to the Safe Drinking Water Act, for example, mandating a whole series of new drinking water standards.

RCRA, just several years ago, was amended substantially to provide increased groundwater protection, for example, from underground storage tanks. Superfund, very recently, was amended and provided broad new statutory responsibilities. The Safe Drinking Water Act, for example, provided us also with a Well Head Protection Program which, as Administrator Thomas pointed out, did not get financial support.

But we are attempting to implement that with the States on a technical assistance basis. So, we have a very, very full plate which we believe will provide enormous amounts of protection. It will take some time to get those things moving and we are not sure that the additional statutes that are being proposed would add substantially to that set of capabilities which we have.

Senator **Sasser**. It would be more persuasive if the Administration would just say that it has got more than it can do at the present time. I will turn to Senator Heinz.

Senator **Heinz**. Thanks for softening up the ground, Mr. Chairman. [Laughter.]

I would like to pursue Senator Sasser's last question though, which is, if everybody else is saying there is a problem and you and USGS are saying, we are the people that everybody is pointing their finger at, but we are not the problem, is there any possibility that you are wrong?

Ms. **Mlay**. I do not think that we are saying there is not a problem. I think there are some enormous problems of availability of good science and data for the people that are working in the groundwater area. I think the testimony, indicates we have a huge job to do, and we need more data.

I think what Mr. Cohen and I are saying is that over the last several years, we have had statutory authority to address coordinationation issues, recognized the problems of coordination, and moved to correct the problems by increasing data compatibility and addressing many other coordination needs. I think that is our answer. We are not saying there are not problems. We certainly are in the midst of them.

Mr. **Cohen**. I certainly would agree with what Marian has just said and as I stated in my opening remarks, certainly we have significant groundwater quality problems and, as a society, we have a major job in front of us.

With regard to coordination, I also stated that the coordination was good and getting better. I did not say it was great, but that it was good and getting better. With regard to some of the previous witnesses and some of the questions that were asked, I know there is not sufficient time, but let me just pick one or two highlights.

There is a substantial debate that needs to be ongoing. EPA has the largest computerized water quality file in the United States and perhaps, one of the largest in the world. Perhaps the second largest in the United States is the Geological Survey's files. The two are, in fact, separate and apart because they were designed to do different things for different purposes. And the public entree into the EPA file is through the U.S. Geological Survey's files.

Those files have been linked for a long time and when they have differences—albeit, some may not be desirable—we have worked very, very hard to minimize those differences and worked very hard to use our funds in the most cost-effective way as possible to provide data.

One of your witnesses said it would be nice to have a universal data file. I would suggest that the cost of such a file would be enormous, beyond anything that this country should and could contemplate. We are, however, making good progress. We have had an interagency coordinating committee in place since 1964, looking solely at water data and water data coordination.

We have a substantial record of developing documentation to assure a good degree of coordination, a good degree of compatibility and methodology. If there is incompatibility, in some cases it is wrong and in some cases, there are good reasons for it.

Senator **Heinz** [presiding]. Tell us a little bit more about this task force or committee that was formed in 1964 to coordinate data.

Mr. **Cohen**. It was formed under OMB Circular A-67, which provided to the Secretary of the Interior, who in turn delegated to the Director of the Geological Survey, the responsibility of coordinating water data collection and analysis throughout the entire Federal establishment.

Senator **Heinz**. What is its method of contacting, interacting with, consulting with the main users of the data? The main users of the data under our system are the States.

Mr. **Cohen**. At the very same time that the Federal coordinating committee was established, we established a non-Federal committee, which sits in parallel with the Federal committee. It consists of representatives of State and local agencies, and virtually all of the major professional water societies and entities of the country. I co-chair one and I am chairman of the other and the Director of the Geological Survey co-chairs the other. So, we link the two.

We link the work of the two and, in fact, we have joint meetings at times. Again, it is not perfect, but it is a reasonably good record that I think we can all be proud of—a record of people talking together and working together to develop standards and consistencies in communications.

Senator **Heinz**. Things seem to be going, at least according to all the other witnesses except you two, very slowly, and the problems keep getting worse. I do not know how to react to your statement that for the development of a certain kind of consistency in the database, it would require spending too much money. I do not know why that would be the case and if you want to send us an analysis of the costs of some significant improvements in the database and related to the payoffs from having data that could be effectively used to make groundwater management decisions, I would appreciate that.

Let me ask EPA, Ms. Mlay, do we have somebody at the Federal level overall who is responsible for groundwater policy, groundwater decision-making, groundwater protection?

Ms. **Mlay**. Well, that having to do with Federal environmental statutes, EPA has the principal role.

Senator **Heinz**. Well, see, now, that is the point. I mean, having to do with a certain set of statutes, one agency having to do with a certain set of statutes and another set a third. We do not have anybody who looks at the big picture, do we?

Ms. **Mlay**. Not in the sense of looking at every agency except that we do have a number of other committees that do look at programs across the board. For example, there is an interagency round table on Federal facilities which deals with all of the groundwater and environmental programs that are implemented across the Federal Government and that is chaired by the Environmental

Protection Agency. So, where there are incompatibilities in terms of implementation of existing statutes, they address that and work with the various programs.

The other area, of course, is the Office of Management and Budget and there is a formal regulatory review process within the Federal Government in which there is oversight. When we propose a regulation, for example, or a policy, OMB assures that all the other Federal agencies have an opportunity to review it and comment and we very often get them involved in the development of those policies. So, there is a mechanism as opposed to a groundwater czar or czarina.

Senator HEINZ. One of the objections you raised to S. 1992 in your testimony, as I understood it, was that there would be created a lead agency.

Ms. MLAY. The implications of the statute with chairmanships of a coordinating committee that involves all of us does begin to get into a lead agency concept which has been talked about in the context of some of these types of bills.

Our concern is that you have to look at the mission of an agency and be sure that an agency has the ability to implement that mission as it has been created in statute. Our concern is that we may have some difficulty in doing that with some of these committees.

Senator HEINZ. That is always true.

Ms. MLAY. That is true.

Senator HEINZ. I mean, that is just an argument for the status quo.

Ms. MLAY. I think it is an argument for the kind of arrangements that we currently have, which really are an integral part of the Executive Branch and follow formal lines as opposed to setting up something different as something aside.

Senator HEINZ. Well, our concern is that there needs to be stronger leadership at the Federal level on groundwater. Now, you and your associates have heard the testimony. I do not think you disagree with that. I do not think you disagree with the notion that things are going very slowly, that there is a lot more that needs to be done. Is that not right?

Ms. MLAY. We are certainly trying.

Senator HEINZ. Excuse me?

Ms. MLAY. I said, we are certainly trying to do better as we go along.

Senator HEINZ. Let's try and be candid about it. Do you believe that the way things are going, five years from now, that we will be really, relatively speaking, further ahead?

Ms. MLAY. Yes, I do, sir. I honestly do.

Senator HEINZ. On what do you base that? You said you do not have adequate resources to do what you want to do now.

Ms. MLAY. I think I am basing it on looking back to 1979 when I first got involved in groundwater in the Agency and people were asking, what is groundwater? There was no recognition of that as an environmental issue. There were few programs that were redirecting themselves toward groundwater protection and I think there has been a major evolution in the Environmental Protection Agency and certainly in our relationship with other Federal agencies on the question.

RCRA, Superfund, the pesticides statutes have all really turned themselves toward groundwater and I think there has been an enormous amount of work. We are probably spending a quarter of our budget now on groundwater cleanup and protection, which is probably more than double or triple just even a few years ago.

So, I look at it in terms of the history and where we came from and also, the enormous amount of authority that we have exercised over the last several years. Thus I think that that momentum will take us into a fair achievement in the future.

Senator HEINZ. If Congress said to the President, look, sure we have something today that we did not have 9 years earlier. We have an Office of Groundwater Protection. It is trying to deal with this problem; the problem, however, is getting bigger, not smaller. It is getting worse. The States are saying, we really need more information than we have receiving. The more we learn, in a sense, the less we know.

When certain kinds of studies are performed by USGS, they do not provide us the kind of information we need. We need a little more state sensitivity to find out the consequences of say, local pollution and what kind of plumes of contaminants are created thereby. We do not sense, the States say, that anybody is taking our concerns as urgently to heart as we feel them at the State or local level. We need to take them to heart.

In view of all of that, what would you say if we said to the President, Mr. President, you decide. You decide who ought to be in charge of the national battle to manage, protect and defend our groundwater. Would you trust the President to do that?

Ms. MLAY. I mean, I trust you and him both.

Senator HEINZ. Well, it is our bill, but it designates the President as the person to make that decision. What is wrong with having the President make that decision?

Ms. MLAY. There is nothing wrong with it. He, through his representatives, has already made such designations

Senator HEINZ. Well, I suspect that if the President did not know about the Iran-Contra affair, he probably does not know about this hearing or this bill. [Laughter.]

So, the purpose of this legislation is to bring it forcefully to his attention so that it might be constructively dealt with. Now, quite seriously, you are saying that you do not like our bill because we asked the President to do that.

Ms. MLAY. I think what we are saying is that we do not feel that it is necessary, that there is a good momentum and there is a structure in place. I think that is the extent of our comment. Dr. Skinner had just motioned to me that he had a point to add.

Dr. SKINNER. Senator Heinz, you have referred several times to the need to get information to States and to the public and you asked one of the previous witnesses how can they find information from EPA. I would like to leave you with a document that I hope you would find useful and I would make copies available to all of the other members of the Committee.

It is a directory of research contacts and groundwater contacts within EPA, at both our regional levels and at all of our laboratories. For example, if someone is interested in finding out how to monitor, they look up monitoring and there will be a name and telephone number of a number of individuals who are expert on that subject.

We take our mission of getting information out to State governments and to the public in this area very, very seriously. We have distributed thousands of copies of this manual and we will be updating it every year or two to make sure that it is up to date. I would like to leave this for you and members of the Committee.[1]

Senator HEINZ. Certainly. We would be happy to have it as part of the hearing record.

Senator HEINZ. I hope you understand that none of us on the Committee are being critical of either of your agencies or of any of the other parts of the Federal Government that are involved here, but we do really sense that there is something in the way of a turf war taking place that may result in a sub-optimal performance insofar as the State and localities are concerned.

I guess that maybe the disappearance of the OMB task force could serve as the most recent example of that. As I understand it, as the task force disappeared, the FCCSET subcommittee was created. Originally, as I understand it, the Department of Interior was designated to chair that subcommittee which I suppose, would have meant someone in USGS; is that not right, Mr. Cohen?

Mr. COHEN. There were some very informal considerations about the chairmanship, and at one time, Interior was being considered as a possible chair.

Senator HEINZ. Well, in the memo prepared by Mr. Zigler, dated sometime last fall, it designates the Department of the Interior. Now the chair is, of course, someone from the National Science Foundation, which is all very interesting but the National Science Foundation is, relatively speaking, not profoundly involved in the kind of hands-on issues that you are involved in.

Why shouldn't we take that as the result of some kind of internal turf war and selecting a neutral party?

Mr. COHEN. A number of points, if I may. As I indicated earlier, the decision was made that the subcommittee would focus on research as opposed to regulatory matters. The National Science Foundation, of course, is a premier research organization within the Federal Government—the premier research organization. That was one of the reasons.

Secondly, I recall the memorandum that you are making reference to. The subcommittee reports to a committee of FCCSET. The committee is the Committee on Earth Sciences, which is chaired by the Director of the Geological Survey. So, in all deliberations as to where the chair would go for the subcommittee, that was a factor also.

It seemed a little awkward to have the Director of the Geological Survey establish a subcommittee and have his chief hydrologist chair that subcommittee. That was one of the major reasons. There was an appearance of awkwardness.

Senator HEINZ. Well, I have a rather lengthy list of questions which I think I will submit to you in writing. We have some other witnesses and the hour is growing late, as Senator Sasser feared it might. Maybe one last question for Ms. Mlay which is that—no, I think I will submit it to you in writing as well.

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[1] See p. 364.

Thank you very much, both of you, for your participation. We hope you will go back and re-read the legislation and maybe after re-reading it, if you change your mind, you could send us an amendment to your testimony saying, Senators Sasser and Heinz, we have read your legislation and it might actually facilitate the mission that we are both at USGS and EPA committed to accomplishing.

Either that or come up with some better reasons for being against S. 1992 because, as Senator Sasser said at the outset, there are all kinds of people saying we need to do what is being proposed in the legislation. What is in the legislation was the result of a deliberative process. We did not take legislation off of somebody else's shelf and just say, humph, that looks good. Let us do something to do anything.

So, hopefully, you might reconsider your thoughts and comments and if you do, we would be happy to receive them. Thank you both very much.

Ms. MLAY. Thank you.

Senator HEINZ. Our last two witnesses are Velma Smith, Director of the Groundwater Protection Project of the Environmental Policy Institute and Eric Draper, Groundwater Project Director, Clean Water Action Project. Ms. Smith and Mr. Draper, welcome. It is good to see you both. Ms. Smith, would you please proceed and if you have a lengthy statement, we will be pleased to incorporate it in its entirety in the record. And I will make the same offer to Eric as well.

TESTIMONY OF VELMA M. SMITH, DIRECTOR OF THE GROUND WATER PROTECTION PROJECT, ENVIRONMENTAL POLICY INSTITUTE

Ms. SMITH. Thank [1] you very much. Good morning. On behalf of EPI, I thank you for this opportunity to testify and commend your interest in the Nation's groundwater resources. As Senator Sasser pointed out earlier this morning, groundwater is a vast and important national resource. Yet despite the importance of the groundwater resource to both human health and environmental quality, the need for its protection seems to have been overlooked for many generations.

Groundwater problems have now been reported in every State, literally thousands of wells have been closed and nearly eighty percent of the sites identified on the Superfund National Priority List manifests problems with groundwater contamination.

Perhaps we face these problems today because we entered the chemical age with the mistaken notion that groundwater is immune from contamination. But today it is clear that groundwater is not uniquely protected from contamination. In fact, it is vulnerable to contamination from a wide variety of activities.

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[1] See p. 274 for Ms. Smith's prepared statement.

The diversity of contamination sources runs the gamut from the homeowner's malfunctioning septic tank to the by-products of the Nation's defense system. Oil drilling, road de-icing, farming, mining, chemical storage and just throwing away our household trash may affect and degrade groundwater resources. Indeed, the National Research Council warns that virtually all human activity may affect groundwater.

Further, along with the diversity of causes, we also find a diversity of existing Federal and State authorities to prevent, detect and correct groundwater contamination. Despite the patchwork of authorities, there are hundreds of communities across this country that will attest to the failure of those authorities to protect groundwater.

EPI believes that the appropriate response to this situation is the establishment of a comprehensive Federal groundwater protection program aimed at preventing the degradation of our groundwater resources and based primarily on a scheme of minimum Federally-established and State-implemented controls on the sources of groundwater pollution.

Rather than speak in detail on the overall response to groundwater pollution, which has become an absolute necessity in our view, however, I will narrow my comments this morning to the aspects of the groundwater issue, which are of most direct interest to this Committee—namely, interagency and intergovernmental coordination.

In the words of the National Research Council again, groundwater protection programs "must link local, State and Federal activities into coherent, coordinated action" to be effective. Groundwater is affected by a wide variety of human activities; groundwater is affected by and in turn effects all other environmental media. Consequently, a strong, coherent intergovernmental program is essential in protecting groundwater.

EPI believes that S. 1992 heeds the words of the National Research Council and sets out a useful approach to enhanced coordination and communication among the many Federal agencies whose actions have a bearing on groundwater quality. In addition, S. 1992 rightly recognizes that local and State governments are active and important players in efforts to protect groundwater and, therefore, their particular day-to-day needs for information and technical assistance should be heard and addressed by the Federal agencies.

If it is made clear that this bill's aim is to foster enhanced protections for groundwater and not to eliminate or undermine particular existing statutory mandates, as I would suspect and hope it is, then the bill's enactment will help to advance our progress in this difficult area.

At the Federal level alone, there are many departments and agencies whose activities may impact the quality of groundwater and whose failure to recognize that impact or to participate in a coordinated effort to protect groundwater could, in essence, sabotage otherwise worthwhile efforts of State and local governments or other Federal agencies.

From the Federal Aviation Administration, which last year was reportedly issuing an advisory on airport firefighting training practices that threaten groundwater to the USGS in its cooperative program which has made possible many State groundwater resource assessments; from the EPA Office of Solid Waste, which has regulatory experience and authority over numerous sources of contamination to the Departments of Defense and Energy, which have bestowed upon countless communities across the country, some of the worst groundwater clean-up problems known today and some of the most persistent and frustrating cases of chronic non-compliance with State and environmental laws: Each of these agencies and departments, as well as others, should be sharing information and expertise and working together to protect groundwater.

One particular case may point to the value of continued communication and coordination that is envisioned in S. 1992. Just a few weeks ago, the Subcommittee on Environment, Energy and Natural Resources of the House Government Operations Committee held an important oversight hearing which addressed, among other things, problems of pesticides in groundwater. In this hearing, Committee Chairman Synar learned from EPA that when the Agency reviews a problem pesticide for potential cancellation and makes its assessment of the pesticide's risk and benefits, as required by law, it generally does not consider non-chemical pest control methods available to the producer. I believe that it is fair to conclude from various lines of questions and answers from the hearing, that EPA does not now work closely with USDA to identify, publicize or encourage the substitution of non-chemical alternatives, even when the chemical alternatives have been found to cause significant groundwater pollution.

In this particular case, we find that although public concern has pressed EPA to the point of developing a pesticides and groundwater strategy and although the concepts of low input agriculture are coming into wider public acceptance, the two agencies whose respective expertise might jointly offer the most promising means of mitigating and eventually eliminating pesticide contamination of groundwater, have apparently yet to link their efforts in a truly productive fashion.

Another example: Under the Surface Mining Control and Reclamation Act's permit application requirements, mine operators are required to submit detailed technical analyses. Unfortunately, voluminous information too often receives scant review by the Office of Surface Mining before it is stored and shelved within that Agency. Certainly, this data might be utilized for other purposes.

Given access to such data, State oil and gas regulators might identify critical hydrologic areas where drilling activity should be subject to special controls. Individual communities might be helped with development of wellhead protection plans, and Federal RCRA permit writers might better assess the possible flow patterns for contamination from hazardous waste facilities. But if those who are responsible for those other programs are either unaware of the existence of this data or are faced with an insurmountable data retrieval problem, then the side benefits to the collection of such data will never be realized.

As that last example indicates, we believe strongly that local and State government officials, as well as Federal regulators, can benefit from better coordination. We are particularly pleased to see that

S. 1992 calls specifically for creation of an advisory group which will relay to the Federal Government the information and technical assistance needs encountered at the community and State level.

While basic scientific research and broad-based national or regional studies should, of course, continue, EPI believes that our groundwater research agenda must become more responsive to the needs and the practical limitations faced by those who are most often on the front line in dealing with groundwater contamination threats and problems—the local and State regulators.

When it comes to groundwater, we must remember that many, many communities simply cannot afford or do not need the state-of-the-art. What communities need is practical, affordable and reliable means of protecting groundwater and responding to contamination incidents. Given the opportunity to directly advise the Federal Government on their technical assistance and information needs, we would predict that local and State representatives will not only identify specific substantive needs but also suggest useful formats and levels of aggregation or detail for information presentation.

From testimony earlier, Senator, you may have detected that there is currently raging a considerable debate over the extent to which Federal Government should become more involved in groundwater quality regulation. There are those who would have us quake at the thought of a traditional Federal environmental role in this arena—the setting of national Federal minimum protections that will safeguard citizens from Minnesota to Mississippi and offer protections to future generations as well as this one.

Within this debate, our organization unabashedly and, we feel, rightly calls for a much stronger Federal role in groundwater protection. Had we additional time to fully debate this point, we would be happy to elaborate. We do recognize, however, that under either the status quo approach or under a new program which vests more authority in the Federal Government, the States and local governments will remain as pivotal players in implementation and response.

In this role, those officials should be offered the best and most usable tools that the Federal Government can share and the provision of S. 1992 which calls for an advisory committee is one which we are happy to support.

We would caution that you may wish to consider adding language to S. 1992 to assure that the representation for that advisory committee is drawn from a good cross-section of States and communities, representing both those which have advanced programs of groundwater protection and those which do not; representing urbanized and rural areas; representing different hydrological settings, in particular, both confined and non-confined aquifer settings; and representing differing levels of resources and existing technical expertise.

In addition, we would urge that the reports and recommendations of this group and the interagency committee be made available to the general public for review and comment and that submission of reports to Congress be specifically required to include a summary of such comments.

In conclusion, Mr. Chairman, we again thank the Committee for its interest in groundwater protection. We support the provisions of S. 1992 as one part of a much needed Federal response to groundwater problems. We appreciate the opportunity to testify and I would be happy to answer any questions the Committee may have.

Senator **SASSER**. Thank you, Ms. Smith. We will turn now to Mr. Draper.

TESTIMONY OF ERIC DRAPER, GROUNDWATER PROJECT DIRECTOR, CLEAN WATER ACTION PROJECT [1]

Mr. **DRAPER**. Thank you, Mr. Chairman. My name is Eric Draper. I direct the Clean Water Action Project's groundwater protection efforts. We are a four hundred thousand member organization with operations in fifteen States. I appreciate the opportunity to offer testimony today.

Our members support a comprehensive national groundwater protection policy with the goal of nondegradation and controls on individual sources and classes of pollution. The proposed legislation, S. 1992, could contribute to the creation of a comprehensive national policy. Groundwater protection requires cooperation, coordination by Federal agencies in the areas of research, resource assessment, technical assistance, contamination prevention and control and clean-up technology.

S. 1992 identifies this need and directs agencies to work together and with State and local agencies to protect groundwater. Substances ranging from carcinogenic pesticides to pathogens, from dangerous gasoline additives to nuclear waste are being found in increasing numbers in water wells. Little is being done at any level of Government to prevent or control or remedy the massive threat to our water.

Groundwater contamination is widespread. It is the inevitable and predictable result of some activities such as mining and agriculture. It is also the careless consequence of wasteful and waste-producing and waste disposal activities. Contamination has occurred in every State and in hundreds of cases, this has led to costly clean-up, treatment and the need to exploit alternative drinking water supplies.

Current evidence of groundwater contamination from human activities supports extensive groundwater protection efforts. Remedies for existing contamination are difficult and expensive. Prevention of contamination through reducing waste and activities that introduce pollutants to groundwater is the only reasonable approach to protection of the resource.

The Nation has no coherent policy to prevent abuse of and degradation of groundwater. Federal agencies have done little, cooperatively or independently, to anticipate and solve groundwater contamination problems. S. 1992 would direct agencies to work together.

Other proposed legislation such as S. 2091, the Groundwater Protection Act, takes a regulatory approach. It shares with S. 1992 the recognition of the need for cooperation and coordination between

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[1] See p. 291 for Mr. Draper's prepared statement.

Federal agencies and States, but a truly protective and preventive groundwater policy would be based on a national goal of nondegradation; would inventory and survey the Nation's groundwater resources and sources of contamination; would establish controls, standards and protections for groundwater; would restore contaminated areas; and would support those activities with research, information, education, and technical assistance.

Until we have a national groundwater policy, we need ambitious and coordinated programs by all agencies. In the face of imminent threats, the imperative is to act. Acting together is necessary in many cases.

Mr. Chairman, on a recent flight to the Midwest, I was the captive audience of a farmer who was also an officer of a major farm commodity organization. The farmer relayed to me the history of his increased use of agricultural chemicals to increase his yields. He was shocked when I responded to the description of his activities with a map showing groundwater contamination in his State.

He was further shocked when I showed him health-based standards for the chemicals he was using. The methods of farming being pushed by the Extension Service were directly responsible for his chemical use; yet he offered no example where he was technically assisted in managing his use of the water contaminating chemicals in such a way as to prevent contamination.

To cite another situation, my organization recently provided support to a group in Oklahoma which is trying to stop a Department of Energy contractor from disposing of process waste water from nuclear fuel processing by spraying it onto the ground. The facility in question has an excellent opportunity to prevent contamination by changing its production processes to eliminate waste, but this seems to be no part of its arrangement with the Department of Energy.

Yvonne Woodman of Duval County, Florida, and her family were relocated from their home after the discovery of a nearby toxic dump. One of the major responsible parties at the site is the Jacksonville Naval Air Base. The Department of Defense has contributed enormously to the creation of toxic dumps in this country. Now, valuable national defense funds are being spent on remedial action to clean up the groundwater contamination.

To cite another example, road salts have destroyed drinking water supplies in western Massachusetts, but it is doubtful that the Department of Transportation has looked to assist States with an alternative method for handling road ice.

We have seen examples of State cooperation between agencies to remedy groundwater contamination problems. In 1983, the State of Florida discovered widespread contamination of groundwater by pesticides. Several agencies gathered into a task force to develop policies to reduce future contamination threats.

Several Minnesota agencies recently gathered to deal with that State's increasing groundwater contamination problems. Elements of their new program include protecting quality, providing safe supplies, increasing knowledge and information, coordinating within the State and within the Federal Government, and providing public information and technical assistance so that decisions affecting water quality can be made in an informed way.

Like State agencies in Minnesota, Federal agencies, though more diverse and removed from specific problems, can and should work toward the common goal of protecting groundwater. S. 1992 provides an essential directive to Federal agencies to do this.

The provisions of S. 1992 require review of agency actions, avoidance of duplication, increased communication and sharing of information are also found in other bills. The assignment in S. 1992 of identifying and planning for technical assistance, information and research is an important feature of the legislation.

Review of State groundwater protection activities reveals that information and technical assistance are major unmet needs. While coordination of research, information dissemination and technical assistance are necessary, more resources and authority need to be invested to actually realize groundwater protection goals.

New initiatives must be launched to survey and inventory the resource and to understand, prevent and control sources of contamination. Much of the authority to do this must lie with the USGS and EPA. Congress should declare that groundwater must not be degraded in any way and must enact laws sufficient to give EPA the power to work with States to achieve that goal. The core of groundwater protection regulations should be reduction of waste, waste creating activities and a halt to practices leading to the introduction of wastes into groundwater.

Several elements to groundwater policy should include research, data collection, standards for drinking water wells not covered under the Drinking Water Act; the development of practices to prevent, detect and control sources of contamination; additional protections for especially vulnerable areas; assistance to States for developing controls; the recognition that groundwater interchanges with surface water; implementation of waste reduction as a primary form of protection; identification of technological controls on all forms of contamination; and targeted and random assessments of contamination.

S. 1992 takes us several steps toward protecting groundwater and provides an essential step of interagency coordination prior to regulation. The approach taken provides a key element in the push for greater protection.

Thank you for introducing the bill and I thank you for the opportunity to talk to you today.

Senator **Sasser**. Thank you very much, Mr. Draper. Judging from some of the comments you have made, it appears that the Federal Government is one of the worst polluters of our groundwater sources in a number of areas.

Let me just ask you very quickly, currently the Environmental Protection Agency, the Department of Defense, DOE among other agencies, are spending large amounts of money and time trying to correct the problems of past groundwater contamination problems. It appears to me that it would be much more cost effective to prevent future groundwater contamination.

Do you feel that this legislation that Senator Heinz and I are proposing will be effective in preventing future groundwater contamination?

Mr. **Draper**. Well, I do. I think that by participating in such a panel and task force that agencies such as the Department of

Energy and the Department of Defense could take a more ambitious and preventive approach toward the activities of their agencies and looking to changing different types of practices and controls and thereby limit the amount of contamination they cause in their activities.

Senator **Sasser**. Senator Heinz.

Senator **Heinz**. Mr. Draper or Ms. Smith, if there were one additional improvement you would like to see us make or change in the legislation, what would it be? You mentioned, Ms. Smith, in your testimony that—you made a modification in your testimony as you gave it—if I am accurate, this legislation does not, in any way, undercut existing standards, rules and so forth and you did not think it was our intention to do so.

That was a little different from what was in your written testimony. Are you concerned that there is something in the legislation that suggests that we might back away from our current, relatively modest amendment to groundwater protection?

Ms. **Smith**. Senator, I think my concern was not prompted by your legislation but perhaps by some of the earlier comments and a lot of emphasis on eliminating duplication or getting rid of unnecessary requirements. I think it is necessary to recognize that there are different statutory mandates, such as there are mandates for Superfund clean-up processes and mandates under RCRA and those may not necessarily always be exactly in line. But I think that those have been enacted by Congress for important reasons and after due deliberation, and I would not like to see a committee, an intergovernmental committee, come together and say, well, you know, we have looked at all of this and these mandates that Congress imposed on us are really duplicative and a problem.

I do not think that is the intent of your legislation. I just would not like to see it become subverted into that sort of agenda. One thing, also, which I did not particularly specify in either my written or oral testimony, but I should add thinking perhaps of the point at which we did have a groundwater committee chaired by the Office of Management and Budget.

I think that situation was of some concern, because the Office of Management and Budget, at least in its current incarnation, has been fairly much obsessed with deregulation and getting rid of information requirements regardless of policy objectives. And so, I would be concerned if the Office of Management and Budget were allowed to play any such role in this type of intergovernmental committee.

Senator **Heinz**. Very well. Mr. Draper?

Mr. **Draper**. Well, I would like to concur with Velma's comment that I think that there should be representation by a broad cross-section of the public and that there should be additional public information on the advisory committee.

Probably the single improvement that I would recommend for the bill is that if, in fact, part of the role of the interagency committee was to set a goal for each agency of doing whatever they can within their agency's activities to reach toward national groundwater protection. I would probably most refer in that situation, for instance, to USDA which, I believe, enacts and carries out policies, in many cases, which act to the detriment of groundwater protection.

Senator **Heinz**. But your comments about what the Department of Agriculture and EPA might do together was most instructive.

Mr. **Draper**. I am sorry. Was that a question?

Senator **Heinz**. No, it was not a question. It was a comment that your testimony, I thought, was most illuminating on the opportunities for a little synergy between the Department of Agriculture and EPA in the excellent case you gave regarding the use of non-chemical means of dealing with pests.

Mr. **Draper**. Thank you.

Senator **Heinz**. Well, I thank you both for your support and your insightful comments, both as to what is going on with our current programs and policies, the threats that we face, the importance of groundwater, and your support for our legislation. We thank you very much.

Mr. **Draper**. Thank you.

Ms. **Smith**. Thank you.

Senator **Sasser**. Mr. Draper, Ms. Smith, thank you very much.

I want to thank all of the witnesses for their testimony here today. It helps lay the further groundwork for the consideration of S. 1992, our groundwater management legislation. I want to thank Senator Heinz for his participation and support today. For the record, I would like to say that we will hold the record open for twenty days for additional comments.

The Subcommittee is adjourned.

[Whereupon, at 12:20 p.m., the Subcommittee was adjourned, subject to the call of the Chair.]

APPENDIX

II

100TH CONGRESS
1ST SESSION

S. 1992

To promote intergovernmental and interagency cooperation in the development of groundwater policy.

IN THE SENATE OF THE UNITED STATES

DECEMBER 21 (legislative day, DECEMBER 15), 1987

Mr. HEINZ (for himself, Mr. SASSER, and Mr. ROTH) introduced the following bill; which was read twice and referred to the Committee on Governmental Affairs

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A BILL

To promote intergovernmental and interagency cooperation in the development of groundwater policy.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. DEFINITIONS.

For purposes of this Act—

(1) the term "Federal agency" means any department, agency, or other instrumentality of the Federal Government, including any government corporation;

(2) the term "groundwater" means water below the land surface in a zone of saturation;

(3) the term "local government" means any city, town, borough, county, parish, district, or other public body which is a political subdivision of a State and which is created pursuant to State law; and

(4) the term "State" means the 50 States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, the Northern Mariana Islands, America Samoa, and the Trust Territory of the Pacific Islands.

SEC. 2. INTERAGENCY COORDINATION OF FEDERAL GROUNDWATER POLICY.

(a) IN GENERAL.—The President shall coordinate activities conducted by the agencies of the United States Government to assist efforts to characterize, classify, manage, protect, and remediate groundwater resources and to design groundwater monitoring programs. The President shall also disseminate information concerning those activities to the appropriate Federal agencies, and State and local governments.

(b) INTERAGENCY COMMITTEE.—

(1) ESTABLISHMENT OF INTERAGENCY COMMITTEE.—In carrying out his responsibilities to coordinate Federal activities under this Act, the President shall establish an Interagency Committee on Groundwater Protection. The Committee shall be established within 90 days from the enactment of this Act. The membership of the Committee shall include each Federal

agency involved in groundwater related activities. The Committee shall be co-chaired by the Director of the United States Geological Survey and the Administrator of the Environmental Protection Agency and shall hold at least two public meetings per year.

(2) DUTIES.—The Interagency Committee on Groundwater Protection shall—

(A) review the activities of each member agency to ensure coordination among such agencies;

(B) identify and eliminate duplications and overlap between or among programs of member agencies;

(C) identify major State technical assistance, information, and research needs;

(D) develop overall priorities and a coordinated plan for addressing State technical assistance, information, and research needs identified in subparagraph (C);

(E) review groundwater information and data collected by member agencies and make recommendations to maximize the value of information collected for programs conducted by the Federal agencies and by State and local governments; and

(F) otherwise facilitate interagency communication on technical assistance, information, and research and development programs which support State groundwater protection and management programs.

(3) Annual report.—The Interagency Committee on Groundwater Protection shall prepare an annual report that summarizes the groundwater technical assistance, information, and research needs of State and local governments, takes into account reports of the Advisory Committee established under subsection (c) and evaluates the extent to which member agencies are addressing those needs. The annual report shall be submitted to Congress not later than January 15 of each year beginning in 1989.

(c) Advisory Committee.—

(1) Establishment of committee.—The President shall establish within 90 days after the date of enactment of this Act, the Advisory Committee on Groundwater Protection (hereinafter referred to as the "Advisory Committee"). The Advisory Committee shall be composed of not more than 11 individuals representing State and local governments. Each member shall be selected from among State and local government officials with knowledge of groundwater issues.

(2) PURPOSE OF COMMITTEE.—The purpose of the Committee is to ensure that the programs and policies carried out by the member agencies of the Interagency Committee on Groundwater Protection are familiar to and meet the needs of State and local government agencies with responsibility for protecting groundwater resources.

(3) CONSULTATIONS.—The Interagency Committee on Groundwater Protection shall meet on a regular basis with the Advisory Committee but no less often than every 6 months to discuss the progress in developing the policies and programs required by this Act. The Advisory Committee shall submit reports, at least one per year, to the Interagency Committee on Groundwater Protection.

(4) ACCESS TO INFORMATION.—The Advisory Committee may request, in writing, access to information from the Interagency Committee on Groundwater Protection. The Interagency Committee on Groundwater Protection is authorized and directed to provide the Advisory Committee with such information as it deems appropriate.

(5) AGREEMENTS.—Each member agency of the Interagency Committee on Groundwater Protection shall enter into agreements and or memoranda of un-

derstanding with the other members of the Committee detailing the responsibilities of each entity in order to avoid duplication of efforts.

SEC. 3. AUTHORIZATION.

There are authorized to be appropriated $2,000,000 in each of fiscal years 1988, 1989, 1990, 1991, and 1992 to carry out this Act.

TESTIMONY OF TERRY COTHRON
DIRECTOR, DIVISION OF SUPERFUND
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

BEFORE THE
SUBCOMMITTEE ON GOVERNMENT EFFICIENCY, FEDERALISM, AND THE DISTRICT OF COLUMBIA
SENATE COMMITTEE ON GOVERNMENTAL AFFAIRS

HEARING ON S. 1992

APRIL 22, 1988

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE, MY NAME IS TERRY COTHRON. I AM THE DIRECTOR OF THE DIVISION OF SUPERFUND FOR THE TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT. I ALSO SUPERVISE THE DEVELOPMENT OF GROUNDWATER POLICY FOR THE STATE OF TENNESSEE.

I AM HAPPY TO BE HERE TODAY TO DISCUSS THE IMPORTANT ISSUES RAISED BY S. 1992.

I THINK THE PROPOSAL FOR AN INTERAGENCY COORDINATING COMMITTEE IS A STEP IN THE RIGHT DIRECTION. WHILE THERE SEEMS TO BE MUCH HYPE AND ACTIVITY IN THE GROUNDWATER ARENA, THIS SUBCOMMITTEE IS VERY ACCURATE IN THAT IT IS NOT COORDINATED.

IT SEEMS THAT NO ONE IS SINGING FROM THE SAME SONG SHEET. FROM THE STATE LEVEL, IT APPEARS THAT AN INCREASING AMOUNT OF RESOURCES AND DOLLARS ARE INVOLVED YET IT IS DIFFICULT TO SEE THE RESULTS.

THE INTERAGENCY COMMITTEE CAN BE PERCEIVED AS A NEW START--THAT CONGRESS IS STARTING TO DEAL WITH THE PROBLEM OF ALIGNING CONFUSING AND CONFLICTING PRIORITIES. HOWEVER, I HAVE A FEW TECHNICAL AND LINGUISTIC CHANGES TO SUGGEST. THE INTERAGENCY COMMITTEE AND THE ADVISORY COMMITTEE SHOULD BE NAMED APPROPRIATELY FOR THEIR MISSION. PERHAPS THE WORDS "GROUNDWATER MANAGEMENT" SHOULD BE SUBSTITUTED FOR"GROUNDWATER PROTECTION" IN SOME PLACES IN THE BILL.

THE PURPOSE OF THE ADVISORY COMMITTEE MIGHT BETTER BE DEFINED AS ASSESSING THE PROGRAMS, POLICIES, AND PROPOSALS THE INTERAGENCY COMMITTEE ADDRESSES, AND OFFERING ADVICE TO THE INTERAGENCY COMMITTEE BASED ON STATE AND LOCAL NEEDS.

IN ADDITION, IT IS NOT APPARENT THAT THE COMMITTEE HAS THE POWER TO CARRY OUT THE CHARGE THAT IT "ENSURE" THAT

THE PROGRAMS AND POLICIES BE CARRIED OUT TO MEET THE NEEDS OF THE STATE AND LOCAL GOVERNMENT AGENCIES.

I SUGGEST SECTION 2.(C)(4), WHICH ADDRESSES ACCESS TO INFORMATION, BE DELETED IN ITS ENTIRETY BECAUSE IT IMPLIES INFORMATION EXCHANGE IS NOT A FREE AND VOLUNTARY PROCESS.

THE REQUIREMENT OF INTERAGENCY AGREEMENTS IS A VALID CONCEPT, SO LONG AS THE OBJECTIVE DOES NOT BECOME THE PROCESS ITSELF.

THE APPROPRIATIONS PROPOSED SHOULD TAKE INTO ACCOUNT THE RESOURCE NEEDS OF STATE AND LOCAL GOVERNMENTS IN SUPPLYING INFORMATION TO AND EVALUATING PROPOSALS OF THE INTERAGENCY COMMITTEE, PARTICULARLY FOR THOSE MEMBERS OF THE ADVISORY COMMITTEE I WOULD ESTIMATE THAT TO BE ABOUT $25,000-30,000 PER YEAR FOR TENNESSEE.

I WOULD LIKE TO SUGGEST THAT SOME ALTERNATIVES BE CONSIDERED FOR THE MANDATE OF THE INTERAGENCY COMMITTEE. THEY MIGHT CONSIDER DEVISING SOME DIFFERENT, INNOVATIVE SYSTEM TO DEAL WITH GROUNDWATER RESOURCE MANAGMENT. THE

GROUNDWATER ARENA IS SO COMPREHENSIVE THAT MANAGEMENT OF THE RESOURCE TREADS ON SOME OF THIS COUNTRY'S FUNDAMENTAL FREEDOMS. FOR EXAMPLE, IT IS OBVIOUS THAT ONE OF THE TOOLS AVAILABLE TO DEAL WITH MAN'S ACTIVITIES WHICH IMPACT THE RESOURCE IS LAND USE PLANNING. YET THE FARM BUREAU BUILDING IN COLUMBIA, TENNESSEE PROBABLY JUST RAISED OFF THE GROUND AS I SAID THOSE WORDS.

AGRICULTURAL ACTIVITIES ARE PERCEIVED BY SOME AS A SIGNIFICANT SOURCE OF GROUNDWATER CONTAMINATION. BUT FOR SOME OBVIOUS REASONS THE AGRICULTURAL INDUSTRY IS RESISTANT TO OUTRIGHT CONTROL. YET THE FARMER IS CAUGHT IN AN IRONY BECAUSE HE IS OFTEN DRINKING THE VERY GROUNDWATER THAT HE OR HIS NEIGHBOR IS CONTAMINATING. A RECENT POLL OF SOME IOWA FARMERS FOUND THAT THE MAJORITY WERE LESS CONCERNED WITH MORE CONTROL THAN WITH INSURING A CLEAN WATER SUPPLY.

WE CANNOT REALISTICALLY EXPECT TO POLICE ALL OF MAN'S ACTIVITIES WHICH IMPACT OUR GROUNDWATER USING

TRADITIONAL REGULATORY PROGRAMS AND WHAT I REFER TO AS THE "HOLE AND BUCKET APPROACH."

MAINTAINING A GOOD SUPPLY OF CLEAN GROUNDWATER FOR OUR FUTURE WILL REQUIRE A DEGREE OF INTEGRATED ENVIRONMENTAL AND NATURAL RESOURCES MANAGEMENT NOT YET WITNESSED ON ANY SIGNIFICANT SCALE IN THIS COUNTRY. AN INNOVATIVE SYSTEM TO LAY GOOD GROUNDWORK FOR GOOD GROUNDWATER WITH MINIMAL REGULATORY ACTION WOULD BE A POSITIVE STEP FOR THE NATION.

IT WOULD BE A TREMENDOUS ACCOMPLISHMENT IF THE INTERAGENCY COMMITTEE COULD DEAL EFFECTIVELY WITH EVEN ONE OF THE ISSUES CURRENTLY MENTIONED IN THE BILL TO ESTABLISH A GOOD WORKING RELATIONSHIP AMONG ITS MEMBERS AND A GOOD TRACK RECORD. DEVELOPING A COMPATIBLE, COORDINATED, AND ACCESSIBLE DATA BASE ON THE GROUNDWATER RESOURCE WOULD REPRESENT AN EXCELLENT START. I BELIEVE THAT IF STATE AND LOCAL OFFICIALS COULD HAVE THE APPLICABLE INFORMATION REGARDING THEIR DRINKING WATER AND THE POTENTIAL IMPACT OF THEIR DEVELOPMENT

DECISIONS, WE WOULD OFTEN NEED TO DO LITTLE MORE THAN OFFER SOME FRIENDLY ADVICE.

ANOTHER IDEA I HOPE THE COMMITTEE WILL CONSIDER IS SHIFTING THE "BEAN COUNTS" CARRIED OVER FROM THE PAST TEN TO FIFTEEN YEARS TO REFLECT NEW INITIATIVES AND PRIORITIES, AND REALLOCATE THE RESOURCES ACCORDINGLY. THIS COULD HAVE GENERAL BENEFIT AS WE STATE FOLKS CONTINUE TO SEE GOOD IDEAS FROM CONGRESS, MORE FEDERALISM, AND LESS RESOURCES.

THE QUESTION HAS BEEN ASKED ABOUT WHETHER THE SYSTEM IS WORKING NOW. TO THAT I WOULD RESPOND "WHAT SYSTEM?" THE STATES THAT HAVE SIGNIFICANT AND COMPREHENSIVE GROUNDWATER MANAGEMENT PROGRAMS FALL INTO THREE GENERAL CATEGORIES: (1) THEY ARE ONE OF THE FEW ENVIRONMENTAL/PUBLIC INTEREST BELLWETHER STATES; (2) THEY ARE ALMOST TOTALLY DEPENDENT ON GROUNDWATER FOR DOMESTIC AND COMMERCIAL USE; OR (3) THEY HAVE FACED A NOTORIOUS AND VERY CONTROVERSIAL GROUNDWATER RELATED PROBLEM OF STATEWIDE OR NATIONAL VISIBILITY. OF THESE FEW STATES, MANY FIT ALL THREE

CATEGORIES, AND MOST HAVE TAKEN THE LEAD THEMSELVES WITH RESPECT TO STATUTES, POLICY, AND RESOURCES. THE REST OF US STILL SUFFER FROM THE GROUNDWATER APATHY CALL "OUT OF SIGHT, OUT OF MIND." IN OUR STATES, UNLESS THE PHONE IS RINGING, GROUNDWATER CONCERNS STILL HOLD THE POSITION OF AN AFTERTHOUGHT. TO ILLUSTRATE TENNESSEE CURRENTLY RECEIVES APPROXIMATELY $114,000 FROM EPA TO AID IN THE DEVELOPMENT OF GROUNDWATER POLICY. THIS ALLOCATION IS STILL AWARDED AS PART OF THE SURFACE WATER GRANT FUNDING FORMULA WHICH MEANS THAT THE ALLOCATION OF THE DOLLARS IS NOT TIED TO THE STATES' DEPENDENCE ON GROUNDWATER OR THE NEED FOR BETTER GROUNDWATER MANAGEEMENT.

IN SUMMARY, THERE ARE ENOUGH ISSUES AND ACTIVITIES NEEDING A SINGLE MUSICAL SCORE THAT THE INTERAGENCY COMMITTEE WILL HAVE NO LACK OF MATERIAL WITH WHICH TO WORK. WE IN TENNESSEE WILL GLADLY ASSIST TO THE EXTENT OF OUR CAPABILITY.

THANK YOU FOR THIS OPPORTUNITY, MR CHAIRMAN.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CUSTOMS HOUSE
701 BROADWAY
NASHVILLE, TENNESSEE 37219-5403

May 18, 1988

The Honorable Jim Sasser, Chairman
Subcommittee on Government Efficiency, Federalism,
  and the District of Columbia
432 Hart Senate Office Building
Washington, D.C. 20510

ATTN: Denise Botsaris

Dear Senator Sasser:

Thank you for allowing me to testify before the Subcommittee on Government Efficiency, Federalism, and the District of Columbia at the April 22 hearing on S. 1992.

In the transcript, which you sent, on pp. 42, line 6 you requested further information. You requested, specifically, a detailed statement of problems encountered in working with various Federal agencies dealing with groundwater. These are enclosed.

Some of the examples attached represent site specific problems, but often with underlying policy and coordination implications. Other examples involve unresolved conflicts between statutes, regulations and policies at the Federal level. The failure to coordinate the resolution of these situations is delaying action to remediate groundwater problems.

Also enclosed in response to Ms. Botsaris' April 27, 1988 request, is a copy of my edited testimony. I found it to be highly accurate, with only minor corrections needed.

Very importantly, you will note that in line 9 on page 40 I responded to a question from Senator Heinz regarding the roles of NWWA, WPCF, and ASWIPCA. The testimony is accurate in accounting what I said. However, I made a mistake in reference with ASWIPCA. Our research indicates that ASWIPCA has made groundwater their top legislative priority. I have spoken to Ms. Linda Eichmiller about this and offered my apology for the error to Ms. Savage personally and the organization. Please take note of this matter in your further deliberations.

If we can be of further assistance, please do not hesitate to contact us.

Respectfully yours,

Terry K. Cothron

Terry K. Cothron, Director
Division of Superfund

I. U.S. Office of Surface Mining (OSM) - Area Mining

There have been ongoing problems with area mines in Sequatche and Van Buren Counties. The problem is one of conflict with OSM regs under Surface Mining Control and Reclamation Act (SMCRA) and the Tennessee Water Quality Control Act. SMCRA only requires groundwater impacts to be minimized in permitted areas while the Water Quality Act specifies no impacts.

The coal seam lies below surface streams in the area. The underlying aquifer is shallow and was not dependable as a water source before mining and supported only a few shallow wells.

When the overburden is blasted and the spoil is laid back it is very loosely compacted which then acts as a sponge for rain water and surface run off. Pyrite in the area causes an acidic condition which is discharging to surface streams with a pH of 2.9 - 3.5. Obviously it is leaching to the ground water at the same rates.

OSM is reluctant to address this problem and is moving slowly on investigating the situation.

CONTACT PERSON: Carl Tenut (615) 594-6035

II. How Clean Is Clean?

At the state level a conflict has been encountered between regulations classifying ground water under the Water Quality Control Act and regulations addressing corrective and remedial activities where ground water contamination exists under the Hazardous Waste Management Act. The issue involves the age-old question: "How clean is clean?" In short, the argument is whether to require clean-up to Maximum Contaminant Levels (MCL's) under the Safe Drinking Water Act versus less restrictive clean-up requirements to Alternate Contaminant Levels (ACL's) under the Hazardous Waste Management Act. This is a state-level conflict. However, the potential for similar conflict exists within Federal legislation addressing ground water quality. CERCLA, RCRA, SWDA, and the pending EPA ground water classification system seem headed for conflict where waters are classified as current or potential drinking water sources. The implementation of ACL provisions under RCRA and/or CERCLA where SWDA would apply MCL's appear very inconsistent.

CONTACT PERSON: Terry K. Cothron (615) 741-6287

III. CERCLA/RCRA Overlap on Sec. 3004(u)

On September 26, 1986 the Environmental Protection Agency (EPA), Region 4, issued a Resource Conservation Recovery Act (RCRA) Permit TN1890090003 in conjunction with Hazardous Waste Permit HSWA TN001 by the State of Tennessee, constituting the RCRA permit for the U. S. Department of Energy at the Oak Ridge Reservation (DOE) in Tennessee. On December 3, 1987 the EPA, Region 4 and the Tennessee Department of Health and Environment (TDHE) entered into an Memorandum of Agreement (MOA) establishing policies, responsibilities, and procedures between the two agencies.

Currently the EPA, Region 4, has the responsibility for evaluating the applicability of Section 3004(u) of the Hazardous and Solid Waste Amendments of 1984 (HSWA). The State of Tennessee has not received delegation for this portion of the RCRA program at this time. Section 3004(u) of RCRA addresses Solid Waste Management Units, (SWMU) which include any discernible units that have ever accumulated, treated, stored or disposed of solid waste. Such units may include but are not limited to any landfill, surface impoundments, waste piles, land treatment units, incinerator, injection wells, tank, container storage unit, recycling unit, or wastewater treatment unit. At the Oak Ridge Reservation there are over 400 of these units, most of which also contain radioactive waste.

It is expected that the Oak Ridge Reservation will be listed on the pending Superfund National Priority List being developed by EPA. If this occurs, it will be necessary for Region 4 to address the issues of whether the SWMU's will be remediated under provisions of RCRA or by the Conservation Environmental Restoration Liability Act (CERCLA). Because the Oak Ridge facilities proceeded in 1986 to address the units under the provisions of RCRA, a switch or dual regulation under CERCLA will potentially be confusing and result in duplication of efforts, documents and time. The DOE and TDHE have requested guidance from EPA Region 4 on this issue but to date have not received any. Meanwhile, DOE is proceeding under RCRA provisions, knowing that documentation and remediation activities requirements may change any day. EPA, Region 4 should provide some guidance on this issue in a timely manner.

Contact Person: Earl C. Leming (615) 594-6466

IV.

MIXED WASTE
RCRA/NRC

The majority of the sites (in excess of 400) on the Oak Ridge Reservation requiring environmental remedial/corrective actions are contaminated with both hazardous and radioactive waste. The Resource Conservation Recovery Act (RCRA) only provides guidelines, standards, and provisions for the cleanup of hazardous waste, ignoring the effects of radioactive contamination to the environment and humans. The Nuclear Regulatory Commission (NRC) regulates the use and disposal of radionuclides but not for Federal Facilities. Therefore cleanup activities on the reservation, performed under RCRA, via EPA/Region 4's decision, address only half the problem. The State of Tennessee, has to date, been unsuccessful in its attempts to cause the NRC or EPA to address this issue. The State is addressing the radionuclides contamination concern by utilizing the Tennessee Water Quality Act, but constantly must reinforce to the DOE and EPA the need to protect the environment and public from both types of waste, not just hazardous waste.

Contact Person: Earl C. Leming (615) 594-6466

RCRA/TENNESSEE WATER QUALITY CONTROL ACT
NEW HOPE POND

In 1962, the Department of Energy impounded East Fork Popular Creek, which flows through the Y-12 facility to create New Hope Pond (NHP). The Environmental Protection Agency (EPA) issued a National Pollutant Elimination Discharge Permit (NPDES) in 1975 which located the discharge point at the outfall weir of NHP. In 1985 the NPDES permit was reissued with modifications, including parameters for all discharges from the Y-12 facility including the outfalls from NHP. In 1986 when the DOE received a Resource Conservation (RCRA) Permit they listed their hazardous waste units and included NHP. In 1987 the EPA determined that NHP had to be eliminated under the provisions of the RCRA permit by November 8, 1988. The Tennessee Department of Health and Environment (TDHE) maintained that NHP should not have been included on the original list of units and should be deleted, which Y-12 attempted to do. EPA has maintained and is currently requiring ongoing elimination of the ponds, irregardless of TDHE's plea to leave the pond in place for very significant environment reasons. The ponds receives all point source discharges from the Y-12 facility via their discharge into Upper East Fork Poplar Creek, which is impounded to create NHP. The pond also receives toxic contaminants from area sources runoff, contaminated groundwater, and spills. NHP acts as a sedimentation/equalization basin for various contaminants and is presently the only available structure to mitigate the impacts on Lower East Fork Poplar Creek, which flows the City of Oak Ridge to the Clinch River.

In this particular case, the EPA chose to take a "hard-line stance" and require the elimination of NHP, even though TDHE was willing to require a safe closure of the basin under the Water Quality Control Act, which TDHE believes would have better protected Lower East Fork Poplar Creek and its biological and fisheries life. The desire of EPA to meet their "check list" has superseded the best interest of the environment, East Fork Poplar Creek, or potential harm caused by a spill at the Y-12 facility.

GW/F4078127

TESTIMONY OF
TERRY FABIAN, DIRECTOR OF THE OFFICE OF NATURAL RESOURCES
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL RESOURCES

on
S 1992, a bill to provide intergovernmental and interagency cooperation in the development of groundwater policy

before the SENATE GOVERNMENT AFFAIRS COMMITTEE
SUBCOMMITTEE ON GOVERNMENT EFFICIENCY AND FEDERALISM

April 22, 1988

Mr. Chairman and members of the Subcommittee, I am Terry Fabian, Director of the Office of Natural Resources in the Pennsylvania Department of Environmental Resources. My office has responsibility for several programs dealing with water resources. Until recently, I was the Pittsburgh Regional Director for the Office of Environmental Resources which has responsibility for many regulatory programs affecting groundwater quality.

Groundwater is a vital resource to all Pennsylvanians, since between 40 and 50 percent of our population relies upon it as their primary source of water supply. Groundwater discharge also provides sustaining baseflow to our streams and rivers. Over the past twenty years, we have undertaken numerous regulatory efforts to preserve this resource for the beneficial uses of our citizenry. We have also conducted studies to characterize this resource, with efforts in Pennsylvania beginning as early as 1925.

The nature of groundwater and the variety of activities which may potentially lead to its degradation demand involvement of agencies at the federal, state and local level. The multitude of agencies involved in the ground water game and the piecemeal manner in which programs have developed has resulted in a fragmented and confusing array of programs, not just on the federal level but on the interstate, state and local level as well.

Each organization has its own specific responsibilities, interests and concerns. Our state agencies have tended to link closely with parallel federal agencies through common bonds of specific research interests or shared objectives. Data collection, and dissemination, evaluation of source control technology, and regulatory responsibility are all affected by this fragmentation.

Continuing efforts at coordination at the federal level are sorely needed, as S 1992 recognizes. The effort needed to coordinate, however, should not be underestimated. There are valid disciplinary and regional differences that must be recognized in any national groundwater strategy.

We cannot honestly tell you that groundwater management efforts in our own agency are coordinated, much less that activities across the

Commonwealth's state and local agencies mesh with each other. The Department of Environmental Resources, Department of Health and Department of Agriculture, local agencies with jurisdiction over land use and interstate compact commissions with regulatory powers within our larger drainage basins all have a role and concerns in groundwater management.

It is clear that state and federal agencies could benefit from data and research results generated by the others. Individual agencies and subdivisions within those agencies may be aware of only a fraction of the activities which are going on in other areas.

The Office of Surface Mining could use EPA research data on impoundment liners in setting design standards for their mine drainage ponds. EPA could use Bureau of Mines' models to predict and evaluate the impacts of underground mining at hazardous waste disposal sites. Data collected by various regulatory agencies could be used by the US Geological Survey in the groundwater characterization activities. Efforts must be undertaken to assure that research results, technology and data are shared, to ensure efficient use of funds and regulatory consistency.

Improved information sharing should also minimize the possibility duplication of efforts, which cannot be tolerated in an era of shrinking federal dollars and expanding needs in groundwater research.

We have had a number of problems in dealing with the fragmented nature of groundwater activity at the federal level:

- the confusing array of potential information sources. The first problem has been to find out which agency has the necessary information, not as easy as it sounds. For example, mining information may be housed within the Bureau of Mines, Office of Surface Mining or USGS. Then, finding the actual information can be exasperating, and in some cases inquiries may be met with apprehension by the agency because of uncertainties regarding the motive behind the inquiry.

- lack of communication between state and federal agencies on available data. Groundwater data is expensive to generate. Laboratory analyses alone may be extremely costly, and collecting samples is quite labor intensive. Sampling should be conducted in a way which will minimize duplication and maximize utility. Although it is not necessarily cost effective to collect every bit of information from each sample that anyone might ever need, it would help if agencies involved in sample collection are apprised of the data collection efforts of their fellow agencies so that these may be coordinated if feasible.

- ineffective data storage and management. Information may be stored in a computerized database, loose paper file or published report. Incompatible data bases are problems which are not easily resolved and may even require hiring experienced systems analysts.

Federal agency reporting requirements may encourage the use of different databases at the state level, which complicates information sharing among state programs as well as federal. We do acknowledge that use of a single database is not practical in view of the different objectives for which data is collected. However, there should be provisions to make collected data available to a wider range of users.

We would certainly support new formal coordinative mechanisms, such as those in S 1992, if they can help solve these problems. The interagency committee established in S 1992 will certainly have a difficult mission; enacting legislation is not like waving a magic wand, as Congress well knows.

We also commend the bill for including a state and local government advisory committee as one way to ensure that federal groundwater activities assist nonfederal agencies which now have the lead role in groundwater protection.

As we envision the mechanism, this advisory committee would provide formal identification of the needs of state and local governments in order to incorporate them into a "mission statement" for federal groundwater efforts. We in Pennsylvania can readily identify many research and technical assistance needs which should be and are not being met at the federal level: health risk information for potential contaminants, improved source control and groundwater cleanup technology, information on contaminant behavior and attenuation mechanisms, and improved models to predict groundwater movement, contaminant transport and the cumulative impacts of multiple sources.

As the necessity to present this testimony here today catalyzed some intragency communication within DER, we believe the advisory committee could provide a catalyst for states like ours to better refine our own priorities in order to get the research, and technical assistance we really want from the federal government. The advisory committee must, however, recognize the very real differences that geographical region play in state groundwater needs, and its membership should reflect that diversity.

In conclusion, we commend the sponsors of S 1992 for recognizing the need for coordination, and for reinforcing the primary role that states play in groundwater resource management. What is needed from the federal government are data and research results on which to found the decisions that state and local governments are called upon to make every day.

As you have asked, we will be submitting written responses to the Subcommittee's Groundwater Policy Questionnaire to the best of our ability. You have asked all the hard questions. There are no easy answers. It may even be difficult to come up with answers that the senior officials charged with groundwater management in the Pennsylvania Department of Environmental Resources can agree upon. But the attention that your legislation and your hearings focuses on this important area of concern is appreciated by all.

PENNSYLVANIA
DER

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 1467
Harrisburg, Pennsylvania 17120

Deputy Secretary for
Resources Management

June 30, 1988

The Honorable John Heinz, III
277 Russell Senate Office Building
Washington, D.C. 20510

Dear Senator Heinz:

This is in follow-up to your request for specific cases involving Federal/State cooperation in matters of groundwater information. After reviewing the types of information provided by other states, I submit the following two cases which are indicative of problems in Pennsylvania.

One of the most significant cases involving the lack of information transmittal and potentially serious environmental problems is that involving the Texas Eastern Gas Pipeline in Pennsylvania. Although the U.S. Environmental Protection Agency was well aware of the problems with PCB contamination at the compressor station sites, there was no effort to communicate the data until it became a public issue. The potential for groundwater contamination from these sites has been identified through the follow-up investigations conducted by the Commonwealth. The delay in moving ahead on this potentially significant problem was caused by the lack of intention or ability on the part of the Federal government to share information and data.

The issue of the Marsh Run Park, the site of a former landfill operated by the New Cumberland Army Depot, located just outside of New Cumberland is another instance. Although the U.S. Army conducted an evaluation and investigation of the potential environmental impacts from their use of the site for waste disposal back in the late 1970's, there is no indication that this information had ever been submitted to the Pennsylvania Department of Environmental Resources for information or follow-up monitoring. In the summer of 1987, additional data was collected and the subsequent report was only submitted to the Department after it became an issue in the news media. This puts the Commonwealth in the position of operating on incomplete data and ofttimes not being able to address potentially significant environmental impacts. The coordination of action between the State and Federal government also remains an issue in this case. The U.S. Environmental Protection Agency contacted us one day prior to their visit to the Marsh Run site rather than attempting to give advance notice for coordination of both investigation and laboratory resources.

It is imperative that all levels of government cooperate in both the identification and problem solving in environmental issues. I hope that this information will support your efforts in that regard.

Sincerely,

Terry R. Fabian
Director
Office of Natural Resources

TESTIMONY
OF
THE INTERSTATE CONFERENCE ON WATER POLICY

BEFORE THE

SUBCOMMITTEE ON GOVERNMENT EFFICIENCY, FEDERALISM AND THE DISTRICT OF COLUMBIA
SENATE COMMITTEE ON GOVERNMENTAL AFFAIRS

Hearing on S.1992
To promote intergovernmental and interagency cooperation
in the development of groundwater policy

April 22, 1988

Presented by
Dayle E. Williamson
Chairman of the ICWP Groundwater Task Force
and
Director of Natural Resources
State of Nebraska

Mr. Chairman, members of the Committee, I am Dayle Williamson and it is a privilege for me to appear before your committee today. I serve as the Chairman of the Groundwater Task Force for the Interstate Conference on Water Policy (ICWP). ICWP is an independent national association of state, interstate, and regional water administrators concerned with water quantity and quality management, conservation, and development. On behalf of ICWP, I thank you for the opportunity to testify and I commend you for the strong interest shown in the coordination of federal agency efforts and the development of groundwater policy.

The members of ICWP believe that the primary responsibility for groundwater management resides and must continue to reside with state and local governments. However, we recognize that states cannot meet the total challenge alone. We have constantly encouraged the tailoring of federal groundwater efforts to meet the needs of state and local authorities. Our recommendation has been one of encouraging an appropriate role of research and technical assistance. Major research efforts are often beyond the capability of individual states' resources and may be unnessarily duplicative unless coordinated at the federal level.

S.1992 is precisely the type of effort we feel is needed at the federal level and we thank Senators Heinz, Sasser, and Roth for introducing it. It will result in improved coordination of federal research, education, and data collection efforts, and help provide the state and local management agencies with the technical assistance and research they need to manage our groundwater resources. It is an excellent idea. However, caution should also be excercised to recognize this legislation constitutes only a small portion of the total future effort required to insure proper groundwater management.

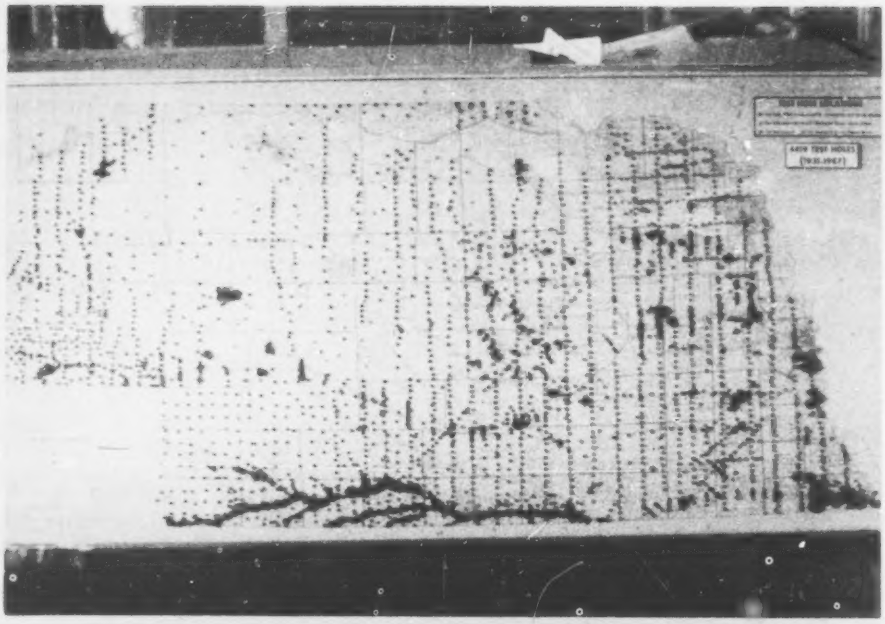
We recognize this sub-committee will hear views that S.1992 is not necessary because interagency coordination on federal groundwater policy is already taking place. We agree that coordination is taking place. In fact, some members of our organization have been complimentary of the current federal agency coordination effort underway. However, one must recognize that while groundwater is currently an issue of major concern, as other issues come to the forefront the cooperative spirit existing among federal agencies at the present time may decline. Other issues may be considered more critical and time, effort, and resources will be directed elsewhere. The so-called "squeaky wheel syndrome," may reduce some of the current effort being put forth for groundwater management unless a formalized coordination agreement is in effect.

Then too, as the Administration changes, priorities can also change. This proposed legislation would provide a vehicle to insure continuous, long-term attention to groundwater problems. Solutions to groundwater management problems are complex. Practical policies must evolve and a structured interagency group with a state and local advisory group could be most helpful in this respect.

Those who say S.1992 is not necessary because coordination at the federal level has improved miss what in our view is the most significant part of the bill. This is the requirement that the Interagency Committee identify state technical assistance, information, and research needs and develop priorities and a plan for addressing those needs. This type of effort is essential if state and local governments are to effectively address their groundwater problems.

In conclusion, Mr. Chairman, ICWP commends Senators Heinz, Sasser and Roth for their initiative in recognizing that the need is not for the authorization of new substantive federal groundwater programs but for greater intergovernmental and interagency cooperation in implementing the programs that are already authorized. We are most supportive of the idea to establish an eleven member Advisory Committee to represent State and local governments within the structure. We urge support of this bill.

Again, I thank you for the opportunity to testify.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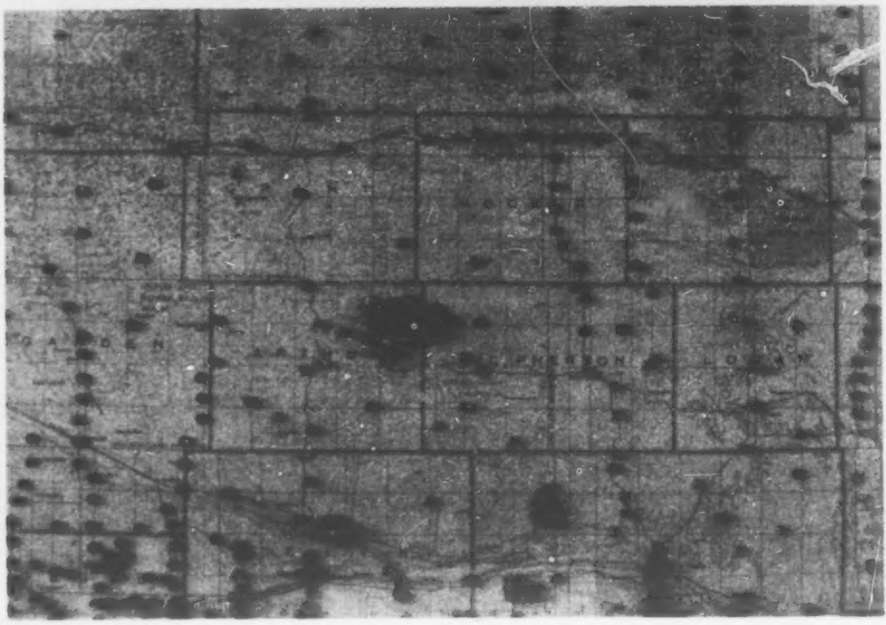
GARDEN
HOOKER
McPHERSON
LOGAN

Testimony
by
The Western States Water Council
regarding
National Ground Water Policy
Submitted to the
Senate Committee on Governmental Affairs
Subcommittee on Government Efficiency, Federalism, and
The District of Columbia
April 22, 1988

My name is Norman Johnson and I am the Legal Counsel for the Western States Water Council. The Council is an organization comprised of representatives appointed by the Governors of sixteen western states. Council members consider a broad range of issues related to the management, protection, and development of water resources in the West. We are therefore grateful for the opportunity to present our views on the subject of national ground water legislation. With the assistance of a special subcommittee, the Council continues to consider its position with regard to national ground water policy, and further policy statements and proposals will likely be forthcoming. My statement today is based on principles enunciated in previous Council policy positions and a Council report. Copies of the Council's previous positions are attached to this statement for your reference. Also, attached is a response to the Subcommittee's ground water policy questionnaire. The response is based on the Council's policy positions.

As is true throughout the Nation, ground water is a critically important natural resource in the West. While the vast majority of ground water use in the western states is for agricultural purposes, ground water is also an important source of water used in industry and mining. Further, half the citizens in the West depend on ground water for their municipal needs. In some areas, the figure is much higher. I believe Westerners, by and large, appreciate the significance of ground water and are willing to take the steps necessary to assure that it is of sufficient quality to allow for its continued beneficial use.

Historic federal policies have emphasized the primacy of states in administering ground water allocation and quality protection. Consistent with this policy of deference, the western states have established permitting programs to govern ground water rights and have developed or adopted various legal mechanisms to protect the quality of the ground water within their borders.

The Western States are geographically and economically diverse. Understandably, western state legal institutions for the protection of ground water quality differ. However, it is important to realize that all western states have established such institutions.

In addition to state ground water quality programs, virtually all western states have legal schemes to govern ground water allocation. Generally, an application must be made before a well may be drilled. A state administrative official or agency will rule on the application based on factors which differ from state to state. Once a permit is issued, the permittee has a legal right, considered a constitutionally protected property interest, to withdraw a certain amount of ground water for beneficial uses.

There is widespread agreement that states should continue to have the exclusive responsibility with regard to the creation and administration of ground water rights. It follows that any proposal for federal ground water legislation must be carefully constructed so as not to interfere with the states' prerogative and ability to manage and protect ground water rights.

With regard to ground water quality, any proposal for federal ground water legislation should recognize that ground water protection is the primary responsibility of the states, and should be supportive of the states' role. It would be inappropriate for Congress to enact ground water legislation mandating that state programs meet rigid requirements and criteria which may not be applicable in the West. Any national policy should be built upon individual state strategies and responsibility for ground water use, management, and protection.

Western states are carrying out their responsibilities to protect ground water in a number of different ways. Further, a number of states are currently restructuring their programs. The Western States Water Council has published a report entitled Western States Ground Water Management, which contains a state-by-state summary of ground water quantity and quality programs for fifteen western states. I will submit with my testimony today a copy of this report so that it may be included as part of the record of this hearing. The report is an update of a similar report which was written in 1982. Another revision may be necessary in the near future because of the projected changes in many state ground water programs. In the Council's view, the western states are actively engaged in carrying out their responsibility to manage and protect ground water resources. National policy should seek to support and enhance these efforts.

A number of bills with the objective of enhancing national ground water policy have been introduced in this session of Congress. As this and the other committees and subcommittees consider such legislation, the following principles should be taken into account in addition to those previously mentioned.

First, ground water management - the protection of its quality and its allocation for beneficial use - requires careful coordination among all levels of government. To this end the Council supports a national policy to guide the actions of federal agencies as they administer programs which impact ground water. This policy should apply to all federal agencies with ground water responsibilities and should be a joint federal/state effort which also recognizes the role of the local governments.

Second, state and local governments must continue to have primary responsibility for ground water management, both quantity and quality. The federal role should be in support of and in accord with state and local ground water management and protection programs. Thus, it must be flexible enough to recognize the differing legal, hydrologic, climatic, economic and social factors that exist in various states and regions.

Third, federal technical assistance should be enhanced under any new legislation. Where some state programs have been less effective than others in achieving ground water protection goals, the underlying problem has nearly always been the lack of technical and financial resources. Any new federal funding for ground water efforts should be directed particularly towards providing increased technical support and should emphasize federal/state cooperative programs. In this regard, the following kinds of technical assistance would be beneficial: (1) assessing the extent of ground water contamination; (2) other data gathering and management; (3) maintenance of a strong and productive research program; and, (4) facilitating information exchange.

Fourth, any new federal ground water legislation should seek to insure a "good neighbor" policy that requires all federal agencies to conduct their activities which have the potential to affect ground water in accordance with state ground water management programs. In this regard, lack of coordination and cooperation by federal agencies with state governments has contributed to difficulties. Federal lands constitute a majority of all lands within the several western states and some of the most troublesome ground water contamination problems which currently exist in the West are directly the result of federal activities on federal land. I have attached to my testimony a brief description of some of these problems.

I would like to reiterate that the members of the Western States Water Council hold as a high priority the commitment to work with Congress and others, to encourage efforts at the federal and state levels that support, not undermine, override, or otherwise impair the successful administration of state ground water management programs. Federal programs should be carefully tailored to support the states in their efforts to carry out ground water quality laws, as well as carefully designed to avoid interference with constitutionally protected property rights to use ground water.

The Council has urged each of its member states to examine its ground water protection program, and, where needed, to take all steps necessary to insure that the program is fully effective in protecting all national and state interests in ground water quality within the state. The most effective ground water quality protection programs will be tailored to meet specific needs which vary from state to state and which may be different from one area of the country to another. Site and situation specific management practices are most effective in protecting ground water quality. State and local programs are best able to carry out such practices.

The Council recognizes that these recommendations are based on active, assertive, effective state protection and management efforts. With the federal government providing appropriate support, the Council is confident that each of its member states will meet the challenge of providing these essential efforts. You may be assured that the Council supports that objective.

WESTERN STATES WATER COUNCIL

Response
to the
SENATE GOVERNMENT EFFICIENCY SUBCOMMITTEE'S
GROUND WATER POLICY QUESTIONNAIRE

1. A more comprehensive federal groundwater protection policy and better interagency and intergovernmental coordination have often been urged, do you agree that S. 1992 addresses those needs?

The Council has taken no position with respect to S. 1992. However, the bill's purposes to improve coordination and coopreation are consistent with policy positions which have been approved by the Council. Ground water management - the protection of its quality and its allocation for beneficial use - requires careful coordination among all levels of government. To this end, the Council supports a national policy to guide the actions of federal agencies as they administer programs which impact upon ground water. Further, the Council has stated that all federal agencies with ground water responsibilities should be involved in the development and implementation of any national ground water policy.

2. Would comprehensive federal groundwater protection policy and the accompanying federal oversight and guidance dilute or reinforce existing state and local policies?

The answer to this question depends on the federal role. If federal legislation were enacted establishing a strong federal regulatory presence which pre-empted state law by requiring that it conform with rigid federal guidelines and other regulatory requirements, it would dilute existing state and local policies. However, if a comprehensive federal policy were aimed at supporting the states in their primary role with respect to ground water management, it could reinforce existing state and local policies and programs.

3. If the primary responsibility for groundwater policy-making were to reside with the federal government, which agency(ies) should set it?

This question has two parts. With regard to the first portion, the Council disagrees with the proposition that the primary responsibility for ground water policy-making should reside with the federal government. Rather, the primary responsibility should be at the state level. However, the Council supports a national policy to guide the actions of federal agencies as they administer programs which impact upon ground water. In this regard, all federal agencies with ground water responsibilities should be involved in the implementation of any ground water policy.

Federal groundwater protection activities might include:

a. approving of state plans for assessment, monitoring, protection, or management;

b. providing technical assistance on matters of hydrogeology, resource assessment, resource management, mapping of acquifers or recharge areas, or data management;

c. providing technical assistance on matters of health effects, criteria setting, mitigation strategies, or remediation strategies;

d. operating an information clearinghouse providing indexing of data, of literature (technical and lay), and of sources of expert advice and services to state and local government;

e. conducting research on: hydrology, hydrogeology, fate and transport of chemicals in the subsurface, monitoring-network design, and analysis of the vulnerability of groundwater to contamination;

f. conducting research and development on techniques for preventing contamination from: agriculture, domestic waste disposal, industry (including extractive industries), and other sources;

g. conducting research on health and ecological effects of contaminants;

h. conducting research and development on methods of remediation and treatment of contaminated groundwater.

These responsibilities are all areas over which several federal agencies currently have jurisdiction. If an interagency committee were to be established at the federal level, how might the various agencies' duties and responsibilities be coordinated to ensure that policy gaps are closed, and duplication of effort avoided?

While the Council does not have specific recommendations regarding how federal agency responsibilities should be coordinated among the agencies themselves, the Council strongly recommends that they be coordinated with state plans and programs for the management and protection of ground water. The establishment of the Advisory Committee envisioned in S. 1992 is a step in the right direction in this regard. The Subcommittee might wish to consider adding to the bill a provision which would specifically require federal agencies to act in conformance with state ground water management and protection programs. This is particularly critical in the western United States where a majority of all lands are federally owned.

5. Cite any exemplary state, local, or federal coordinated groundwater management efforts which you are aware of that could serve as a model for any future coordinated federal interagency entity.

A good example of coordination with respect to ground water management in the western states occurs in California where the agency most often in the lead role is the State Water Resources Control Board. The Board is responsible for both water rights administration and quality management. The Board is represented by nine regional Water Quality Control Boards with regional water quality/quantity authority. While a number of other state agencies have some responsibilities with respect to ground water problems, the Water Resources Control Board has ultimate authority.

Another example of coordination in the western states occurs in Montana where the Department of Health and Environmental Sciences (DHES) has primary responsibility for ground water quality management whereas the Water Rights Bureau of the Department of Natural Resources and Conservation (DNRC) has primary responsibility with respect to ground water quantity. Ground water allocation and ground water quality conflicts are resolved through informal and formal contact between DHES and DNRC. Water appropriation permit applications are sent by DNRC to DHES. DHES may submit objections to the applications before a permit is issued. Although the permit criteria do not specifically mention water quality, such effects are considered.

6. Cite any examples of the inefficiency or ineffectiveness of attempts to coordinate groundwater management efforts which you are aware of that serve to illustrate the need for change.

Past failures of the federal government to coordinate ground water management by complying with state laws and programs have contributed to significant ground water contamination problems on federal land. In some cases the on-reservation activities have affected or may affect off-reservation ground water supplies. The Council has documented examples of ground water problems associated with federal lands and federal activities in the western United States. A copy of that documentation is attached.

GROUND WATER CONTAMINATION IN THE WESTERN STATES ASSOCIATED WITH FEDERAL LANDS

The following list contains some examples of ground water problems associated with federal lands and federal activities in the Western United States. It is offered as an appendix to testimony presented by Craig Bell, Executive Director, Western States Water council, at hearings on national ground water policy held by the Water and Power Subcommittee of the Senate Committee on Energy and Natural Resources, June 18, 1987.

Arizona

Five federal reservations in Arizona have significant, documented ground water contamination problems. Four of these are in or adjacent to heavily populated areas. One, the Navajo Army Depot, is not located in a densely populated area. Williams and Luke Air Force Bases are in or adjacent to Phoenix. Davis-Monthan Air Base is in Tucson and the Yuma Marine Corps Air Station is in Yuma. The ground water contamination at the sites has occurred as the result of defense-related activities.

California

A number of federal reservations in California have ground water pollution problems related to toxic contaminants. They are are as follows:

Region 2 - San Francisco Bay Region: Alameda NAS, Alameda; Moffit NAS, Mountain View; Travis AFB, Fairfield

Region 3 - Central Coast Region: U.S. Penitentiary, Lompoc; U.S. Army, Fort Ord; U.S. Air Force, Vandenberg AFB

Region 4 - Los Angeles Region: Pacific Missle Test Center, Pt. Magu, Ventura Co.; U.S. Navy Fuel Depot, Van Nuys

Region 5 - Central Valley Region: Mather AFB, Sacramento County; McClellan AFB, Sacramento County; LeMoore NAS, King County; Castle AFB, Merced County; Beale AFB, Yuba County; Sharpe Army Depot, San Joaquin County; Sacramento Army Depot, Sacramento County; USDA, Fresno, Fresno County

Region 6 - Eastern Sierra Region: China Lake Naval Weapons Center, Kern County; Ft. Irwin National Training Center, San Bernardino County; Edwards AFB, Kern County; USMC Logistics Base, San Bernardino County; George AFB, San Bernardino County

Region 7 - Colorado River Region: USMC Base, Twentynine Palms, San Bernardino County; USDI, Joshua Tree National Monument, San Bernardino County

Region 8 - Santa Ana Region: U.S. Naval Weapons Center, Orange County; March AFB; USMC, Tustin Air Station;Norton AFB, San Bernardino County

Region 9 - San Diego Region: USMC, Camp Pendleton

Colorado

The most serious ground water problems in Colorado have to do with federal activities and federal facilities. The most significant one, which is one of the most polluted spots in the Nation, is the Rocky Mountain Arsenal where contamination goes back to nerve gas production during World War II. The state has sued the Department of the Army in federal court over contamination at the site. The suit is pending. From the state's point of view, some progress is being made in cleaning up the site.

Two other sites where serious ground water problems exist are Rocky Flats, where nuclear by-products have caused ground water contamination, and the Martin Marietta site. Rocky Flats is owned by the Department of Energy and managed by Rockwell, . International. The United States Air Force owns some land at the Martin Marietta site, although most is owned by Martin Marietta. Virtually all of the company's work is done under government contract in military and space programs.

These three sites encircle the city of Denver. All are within the "five county metro area." The contamination which has occurred is severe.

In addition to sites mentioned, it is likely that operations at Army depots located in Colorado Springs and Pueblo, Colorado, have caused ground water contamination.

Idaho

Five sites at the Mountain Home Air Force Base have been identified as having either contaminated ground water or as posing serious threats to ground water. The sites are a fire training pit, a former landfill now used as a sewage treatment lagoon, an entomology lab, an existing landfill, and an historic petroleum spill.

Another federal facility in Idaho, the Idaho National Engineering Lab, has significant ground water contamination. The lab is operated by the Department of Energy. The Defense Department also has work being performed there. Monitoring indicates that radioactive waste disposed of in an injection well, and handled at sites around the well, has created a defined plume of contamination below the site. So far, the plume has not migrated off from federal land. However, it may in the future. A major contaminant in the plume has a relatively short half-life and radioactive decay may reduce its radioactivity before it migrates off-site. Some of the other contaminants, however, are longer-lived isotopes.

Nevada

Preliminary tests indicate that at least two federal sites in Nevada have ground water contamination problems. One, the former Stead Air Force Base (now a private base) is located just north of Reno. The concern is over past disposal practices of cleaning solvents which likely contaminated ground water. The other site is the Fallon Naval Air Station. Initial data from this site indicates problems associated with cleaning solvents and the potential for hydrocarbon contamination.

North Dakota

Arsenic has been detected in some public drinking water supplies in Lidgerwood, Rutland, and Wyndmere, North Dakota. Ground water sampling in the area indicates varying levels of arsenic, with some unusually high levels. Records show that arsenic-laced grasshopper bait, provided with federal funds and under cooperative agreements between the state and the U.S. Department of Agriculture, was used heavily in the area in the 1930's. Research performed by the state indicates that ground water contamination from disposed bait could be taking place, but no disposal site has yet been confirmed. A probable point source of contamination, located at a former bait mixing site, will require further investigation.

Oregon

The Ordinance Army Depot is located near the City of Hermiston, in northern Oregon on the Columbia River. The depot has been a storage area for nerve gases and other chemical weapons and has been used as a neutralization area for some arms. These federal activities have led to demonstrable ground water contamination in the area.

Utah

Ground water contamination from the storage of solvents in open ponds and leaking drums located at Hill Air Force Base has led to contamination of ground water both on and off from the base. A number of toxic chemicals have been detected in test wells. Also, severe ground water overdraft problems have occurred because of activities at the base. For years, the Air Force refused to obtain ground water permits from the state for pumping on the base.

Ground water contamination has also occurred at the Tooele Army Depot. The major cause is cleaning solvents which have been used by the Army. Significant on-site contamination has been

WESTERN STATES WATER COUNCIL
Statements of Principle Regarding Federal Ground Water Quality Legislation

April 11, 1986

The Western States Water Council supports the following principles relating to federal ground water quality legislation.

Section 1. Policy

A. Ground water quality protection is the primary responsibility of the states.

B. The federal role should be one of support and back-up.

Section 2. Ground Water Quality Protection - Criteria and Standards.

A. States shall have the responsibility to set standards of water quality, based upon beneficial uses - present and future.

B. State standards shall be approved as federal standards unless they do not meet national public health requirements.

C. Federal standards shall be set within a state only if a state does not set standards as provided in A. above and only as they relate to ground water quality standards for the protection of public health.

Section 3. Ground Water Quality Protection - Strategy and Mechanisms.

A. States shall establish strategies and mechanisms that are appropriate for protecting ground water within their borders.

Section 4. Federal Role.

A. Federal actions shall be designed to be in support of and in accord with state programs of sections 2.A and B. and 3.A.

B. Federal funds, with few strings, shall be provided to states for development and implementation of their ground water quality programs.

C. Federal technical assistance and training of personnel in state ground water management programs shall be provided.

D. Notwithstanding any provisions of any federal statute (regulatory or remedial), e.g., RCRA, CERCLA, CWA, SDWA, TSCA, except in emergency situations, no federal agency shall take any action pertaining to ground water protection unless it first obtains a certification from a state that:

   1) The federal action is consistent with state objectives, standards, and strategies for protection of its ground water; and

   2) The federal action will not duplicate regulatory or remedial actions of a state - actively pursued or to be pursued within the reasonable, foreseeable future.

POSITION of the WESTERN STATES WATER COUNCIL Regarding GROUND WATER PROTECTION

April 13, 1984

WHEREAS, ground water is a precious and highly valued natural resource upon which our nation relies for a wide range of beneficial uses; and

WHEREAS, ground water management - the protection of its quality and its orderly, rational allocation and withdrawal for various beneficial uses - requires the highest quality coordination of efforts among all levels of government; and

WHEREAS, consistent with historic, federal policies emphasizing the primacy of states in the administration of water allocation and quality protection, the several western states have ground water allocation and protection programs in their laws; and

WHEREAS, recognizing the need to improve significantly the implementation of these state laws, all of the states have or are capable of pursuing actions to insure that improvement objective is reached; and

WHEREAS, taking into account the urgent need to protect ground water quality, Congress is now considering a number of bills with various thrusts relating to said protection; and

WHEREAS, several of these congressional proposals contain elements that would increase the federal role in ground water administration in a fashion that may well undermine the aforementioned state programs; and

WHEREAS, the national administration, through its Environmental Protection Agency, is about to initiate a ground water strategy that contains a significant potential, if not carefully developed and implemented, to undermine the primacy of the very state ground water programs the national administration so strongly espouses.

NOW, THEREFORE, in light of the foregoing, the Western States Water Council resolves that it:

1. Urges Congress, in its consideration of proposed ground water legislation, to limit enactments to those proposals which are faithful to and supportive of the primacy role of state administered programs; and

2. Urges the National Administration, in its implementation of a ground water strategy through the EPA and other agencies, to tailor its efforts so as to insure they are supportive of the primacy role of these state programs; and

3. Gives a high priority commitment to work with Congress and the National Administration, in a spirit of cooperation and goodwill, to bring about enactments and strategies at the federal level that support, not undermine, override or otherwise impair, the state primacy policy and the successful administration of state programs; and

4. Urges every member state to examine its ground water protection program and, when needed, to take all steps necessary to insure that it is fully effective in protecting all national and state interests in ground water quality within the state; and

5. Urges every member state, working in coordination with its sister states and this Council, to make a similar commitment to that set forth in Resolution 3 hereof.

The chairman is directed to provide copies of the resolution to all members of congressional delegations of the member states, the President, the Secretary of the Interior, the Administrator of the Environmental Protection Agency, and the Western Governors' Association.

Comments of the Western States Water Council
to the
United States Environmental Protection Agency
Pertaining to its Draft --
A Groundwater Protection Strategy for the
Environmental Protection Agency
dated January, 1984

Adopted in Salt Lake City, Utah
April 13, 1984

This is written in response to your invitation to provide comments relating to the proposed "strategy" for groundwater quality protection made public in January, 1984. The Council is appreciative of the invitation. Its views follow.

I. Introduction -- Commendation.

The Environmental Protection Agency (EPA) is to be commended for its efforts to highlight the need for greater emphasis on the protection of the quality of the groundwaters of the various states. The strategy sets forth well the wide-ranging present and future reliance by our citizenry on groundwaters to satisfy their water supply needs. The detailing of various threats to the quality of these public groundwaters are both accurate and of great concern.

The four major thrusts of the EPA's strategy are, in primary part, sound. We refer to the strategy's:

(1) Support for Primary State Administration of State Programs;

(2) Survey of Unaddressed Threats to Groundwater;

(3) Guidelines for Groundwater Protection; and

(4) Improving EPA's Institutional Capability.

We do, however, have several concerns which we bring to your attention.

Our overriding concern centers upon the roles to be performed by the federal government and the individual states in groundwater quality protection. In order to understand fully our perspective, we provide this short backdrop on federal policy.

Within our federal system, it has been a longstanding, uninterrupted Congressional policy that individual states occupy the dominant role in water quantity and quality management and protection.1/ This historic federal policy has not only emphasized a strong deference to state regulation but has actively encouraged

Comments of the Western States Water Council
to the
United States Environmental Protection Agency
Pertaining to its Draft --
A Groundwater Protection Strategy for the
Environmental Protection Agency
dated January, 1984

Adopted in Salt Lake City, Utah
April 13, 1984

This is written in response to your invitation to provide comments relating to the proposed "strategy" for groundwater quality protection made public in January, 1984. The Council is appreciative of the invitation. Its views follow.

I. Introduction -- Commendation.

The Environmental Protection Agency (EPA) is to be commended for its efforts to highlight the need for greater emphasis on the protection of the quality of the groundwaters of the various states. The strategy sets forth well the wide-ranging present and future reliance by our citizenry on groundwaters to satisfy their water supply needs. The detailing of various threats to the quality of these public groundwaters are both accurate and of great concern.

The four major thrusts of the EPA's strategy are, in primary part, sound. We refer to the strategy's:

(1) Support for Primary State Administration of State Programs;

(2) Survey of Unaddressed Threats to Groundwater;

(3) Guidelines for Groundwater Protection; and

(4) Improving EPA's Institutional Capability.

We do, however, have several concerns which we bring to your attention.

Our overriding concern centers upon the roles to be performed by the federal government and the individual states in groundwater quality protection. In order to understand fully our perspective, we provide this short backdrop on federal policy.

Within our federal system, it has been a longstanding, uninterrupted Congressional policy that individual states occupy the dominant role in water quantity and quality management and protection.1/ This historic federal policy has not only emphasized a strong deference to state regulation but has actively encouraged states to initiate comprehensive regulatory programs. Of special note in relation to the strategy, recent federal environmental protection programs have not altered the fundamental Congressional policy of state primacy in water quantity and quality regulation. 2/

The strategy, on various occasions, rightfully emphasizes this state primacy policy. Consistent therewith, the strategy discusses a policy of financial support of state efforts which, if modified appropriately, would measurably assist state protection activities.

II. Concerns.

The major concern of this Council is that, despite numerous good faith statements of assurance in the strategy, EPA has inadvertently developed a very real potential for upsetting the dominant state regulatory role the strategy so strongly espouses.

A. The Strategy's Aquifer Classifications Guidelines.

Our concern centers upon the significance of EPA's aquifer classification system. This system is proposed to bring uniformity in the implementation of EPA's programs that touch upon groundwater protection, certainly a reasonably objective. However, in so doing (and despite the strategy's express disclaimers), the system implicitly (if not expressly) sets water quality criteria or standards for application to all groundwater bodies or zones within a state. Likewise, the strategy mandates that to obtain and retain federal approval of state administration of various environmental protection programs relating to groundwaters, they must be at least as stringent as the requirements of the classification system. In sum, the overall effect of the classification system so administered may amount to a long step towards reversing the historic, Congressionally approved federal and state roles. Determinations as to the levels of treatment required for various water bearing zones, the foundation element of any groundwater protection, may well be effectively transferred from the various states to the federal government.

We respectfully submit that Congress, by empowering EPA over the last decade to administer various environmental protection regulations and clean-up statutes, did not intend such a role change. Likewise, we believe EPA did not intend such a result.

In this light we urge EPA to review its strategy with the greatest of care to insure against any dramatic, unintended and unwise shift in the allocation of federal and state power. Following thereon, we recommend modifications to the strategy which emphasize a state role for development of groundwater protection programs and provide the necessary flexibility for the states to develop programs appropriate in the respective states, with foundation elements which include: (1) aquifer protection standards or criteria to protect all legitimate interests (including federal) for various water bearing zones, and (2) mechanisms to assure their protection. Thereafter, EPA's strategy should be modified to announce the implementation tone for all of EPA's programs (supplementary as they are to the basic state programs) i.e., EPA programs shall at all times be administered in a manner that is consistent with and supportive of the foundation elements of the state program.

A carefully crafted remodeling of the strategy can alleviate the Council's apprehensions and, more importantly, set forth a harmonious, effective federal and state effort that is unquestionably faithful to historic federal policy.

B. Federal Funding of State Efforts.

EPA's proposal to fund state primacy efforts in groundwater protection is well motivated. It supports the strategy's objective of building and enhancing the strength and effectiveness of state programs.

The principal concern with the strategy's funding approach is that no new federal moneys are provided for the states. Rather the moneys proposed for state groundwater protection efforts are to be taken from federal funds that are now being provided to carry out other environmental protection efforts. Such a redistribution of federal moneys allocated to a state is unsatisfactory unless it is clear that the moneys so transferred are no longer required for the purposes for which they have been originally provided. In sum, the Council recommends that EPA examine all of its existing sources of money with an eye towards increasing grants to states. Redistribution of existing grant moneys is not enough.

More flexibility should be considered by EPA in terms of the use of federal funds by states to improve their groundwater protection efforts. The strategy's limitation on state use of funds to program development is too restrictive. Use thereof for implementation and development of state programs should be allowed. We note, in this regard, that states that have already developed groundwater programs are ineligible for funding because of the limitations just noted. Furthermore, it may well be that the concentration of funding on program development will not provide the maximum attainable return on the federal dollar invested.

III. Other Strategy Observations.

A. Unaddressed Groundwater Problems.

The Strategy's emphasis upon the inventorying of inadequately addressed sources of groundwater contamination, e.g., underground storage tanks, is meritorious. It is a positive and necessary first step in the development of a federally supported state program of prevention and cleanup in this important area.

B. Reorganization of EPA's Internal Organization

The strategy's emphasis on strengthening EPA's internal ground water organization is well placed. The proposed creation of a special groundwater office would benefit the states by providing for improved liasion and valuable coordination between EPA and the states at a high level within EPA.

This new office would be of great value to EPA's internal operation. With proper focus, the new office could insure that, internally, all EPA groundwater related activites are coordinated, especially in insuring that they are conducted in accord with and in support of the dominant, comprehensive groundwater quality program established by each state. From an external standpoint, the new office would provide each state with expeditious, effective access to EPA both in Washington, D.C. and regionally. This access, properly administered by EPA, would provide a coordination point leading to greater harmony of federal-state program implementation.

The strategy is silent with regard to groundwater contamination arising on federal lands, which, we note, constitute a majority of all lands within several western states). We urge the inclusion of a EPA "good neighbor" policy that encourages all federal agencies to conduct their activities in accord with state groundwater protection processes and requirements. The new office could measurably assist in achieving this important objective.

IV. Conclusion

The Western States Water Council applauds EPA, once again, for putting forth an overall well done draft strategy.

The comments and suggestions provided herein are, in accord with Congressional policy, designed to assist EPA in establishing its appropriate role in the critically important area of groundwater protection. The Council's recommendations to EPA are based on the fundamental premise, recognized and espoused by EPA, that the various states have primary responsibility for establishing and administering sound groundwater protection programs that protect all legitimate federal and state interests. EPA's secondary role of providing technical, scientific, and financial support to the dominant state effort, is equally important. A carefully developed EPA strategy, modified along the lines suggested herein, will go far in achieving a harmonious, effective, efficient groundwater protection program that protects all legitimate interests.

The Council recognizes that its recommendations are based on active, assertive, effective state protection efforts. With EPA providing its full "backup" support, we are confident that every member state of the Council will meet the challenge of providing these essential efforts. You may be assured that the Western States Water Council supports that objective.

EPA has worked closely with the Council in this important endeavor. We appreciate that spirit of intergovernmental cooperation. The Council looks forward to working with EPA to assure that the valuable groundwaters of our nation are fully protected in the national interest.

1/ See, e.g., Resource Conservation and Recovery Act, 42 U.S.C.A. §§ 6901 *et seq.*; Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C.A. §§ 9601 *et seq.*; and Safe Drinking Water Act, 42 U.S.C.A. §§ 300(f) *et seq.*.

2/ *California v. United States*, 438 U.S. 645 (1978); *United States v. New Mexico*, 438 U.S. 696 (1978); and *Andrus v. Charlestone Stone Products Co., Inc.*, 436 U.S. 604 (1978). Cf. *Sporhase v. Nebraska*, ___ U.S. ___, 102 S. Ct. 3456, 73 L.Ed.2d 1254 (1982). See also 33 U.S.C.A. 1251(b).

RESOLUTION
OF THE
WESTERN STATES WATER COUNCIL
CONCERNING
GROUND WATER POLICY

McAllen, Texas
January 14, 1983

WHEREAS, a draft proposed ground water policy has been developed by EPA and submitted to the Cabinet Council on Natural Resources and Environment for review; and

WHEREAS, western states have extensive ground water planning and management experience, recognize the importance of ground water resources to the national health and welfare, and realize the exigency of protecting ground water for present and future needs; and

WHEREAS, the draft policy outlines federal and state roles -- recognizing the central and critical role of the states in future efforts to protect this resource; and

WHEREAS, the states have heretofore had limited input in development of the draft policy.

NOW THEREFORE BE IT RESOLVED, that the Western States Water Council strongly urges EPA to more actively seek state participation in any future decision making, particularly with respect to implementation of any policy; and

BE IT FURTHER RESOLVED, that the Western States water Council strongly supports the following concepts, which are incorporated in the draft policy, and urges their adoption:

(1) State and Local Governments have responsibility for ground water management, both quantity and quality.

(2) Any national ground water policy must be a joint federal/state effort, also recognizing the role of local and regional (interstate) government units.

(3) Any national policy should be built upon individual state strategies and responsibility for ground water use, management and protection.

(4) The states should be allowed maximum flexibility in developing voluntary state strategies which recognize state and regional differences within federal statutory constraints.

(5) Any national policy should coordinate program activities of all federal agencies with ground water responsibilities.

(6) The role of the federal government should be limited to federal/state cooperative programs and to providing technical assistance in (a) assessing the extent of ground water contamination problems, (b) data gathering and data management, (c) maintaining a strong and productive research program, and (d) facilitating information exchange.

RESOLUTION
of the
WESTERN STATES WATER COUNCIL
concerning
GROUNDWATER POLICY
Scottsdale, Arizona
January 15, 1981

WHEREAS, the Western States Water Council (WSWC) recognizes that the welfare of the individual states and the nation is dependent upon the maintenance of adequate supplies of high quality water; and

WHEREAS, programs to ensure an adequate supply of good quality groundwater are, in the view of WSWC, the primary responsibility of the states, and most western states have long recognized that groundwater management programs must assure the protection of groundwater to meet present and future needs; and

WHEREAS, to meet their needs most western states have developed extensive groundwater planning and management programs, and therefore, while WSWC supports a national policy to guide the actions of federal agencies as they administer programs which impact upon groundwater, WSWC does not support and will actively oppose any proposal which interferes with the ability of the states and local governments to carry out their responsibilities in managing the water resources.

NOW THEREFORE, BE IT RESOLVED BY THE WSWC that any national policy to manage and protect groundwater must be based upon the following concepts:

1. The states and local governments must continue to have primary responsibility for groundwater management, both quantity and quality. Cost effective programs, many already in existence, can be structured to meet the widely varying groundwater conditions and the varying uses of groundwaters in each state.

2. All federal agencies with groundwater responsibilities must be involved in the development and implementation of any groundwater policy. Many times effective state and local programs have been hampered by federal programs administered with little or no coordination through separate federal agencies. Often these federal programs have failed to recognize the interrelationships between quality and quantity and between surface and groundwater.

3. The states are willing to cooperate with the federal government regarding development of general groundwater policy, but specific procedural items must be left to the state and/or local government.

4. The role of the federal government in groundwater protection should be to provide leadership by fostering ideas, knowledge and methods rather than through penalities and direct enforcement actions. The operation of research and training facilities is cost effective if accomplished nationally or regionally, rather than if each state has its own program.

5. National groundwater policy must be flexible enough to recognize the differing legal, hydrologic, climatic, economic, and social factors that exist in the various states and regions. Rigid requirements will be counterproductive when applied nationwide.

6. A national groundwater policy should be a joint federal/state effort, while also recognizing the legitimate role of local and regional (interstate) government units. The WSWC supports the concept of keeping government programs at the local level whenever they can be effectively applied.

7. A national groundwater policy should build upon the basic state responsibility for groundwater use, management, and protection. Overall groundwater protection and groundwater allocation should be part of a state's general water management program. The WSWC believes there must be comprehensive programs in each state to manage and protect groundwater resources. The WSWC will work with Congress and the Administration in efforts to develop national groundwater policy that will strengthen the states and local ability to manage and protect groundwater resources.

WRITTEN TESTIMONY OF
DONALD V. FELICIANO
ASSOCIATE, BOOZ·ALLEN & HAMILTON INC.
BETHESDA, MARYLAND

on S. 1992

BEFORE THE
SUBCOMMITTEE ON GOVERNMENTAL EFFICIENCY,
FEDERALISM, AND THE DISTRICT OF COLUMBIA
COMMITTEE ON GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

May 18, 1988

I would like to thank the Chairman and members of the subcommittee for the privilege of presenting testimony on S. 1992, a bill to promote intergovernmental and interagency cooperation in the development of groundwater policy. It is my belief that how the Nation addresses groundwater policy within the next few years will impact directly on the quality of drinking water in the United States in the next century.

I support the intent of S. 1992. In view of the fact that passage of national groundwater legislation is a long way off, I support any effort to improve the Federal/State role and interaction in groundwater protection and policy development at this time. What Senator Heinz and you are advocating is simply a mechanism for getting everybody in the same room and talking about the same subject--groundwater protection. I am sorry that such interaction would have to be mandatory, but experience has shown that voluntary efforts at interagency and intergovernmental cooperation have not worked effectively.

My only recommendations are that the proposed legislation includes a statement of congressional findings that make such legislation necessary, and expanding the intent of the Interagency Committee's role to include the development and dissemination of groundwater protection information to State and local governments and the public. In a time of an enormous Federal deficit and dwindling Federal aid to the States, at the very least the Federal Government must consolidate its expertise on groundwater protection and pass on useful information to State and local governments and the public on how they can manage protection. Information need not be only technical for use by regulators; practical information for the public also will do much to protect groundwater. In this context, I would support the inclusion of public representatives on the Advisory Committee. My specific comments on the legislation are provided in Appendix I of this testimony. My responses to your questionnaire are included in Appendix II.

I would like to give you a perspective of why I believe that legislation such as S. 1992 is needed. Considering that our national understanding of groundwater contamination was rather limited prior to 1980, I believe that great strides have been taken at the Federal, State, and local level toward protecting groundwater in the last 8 years. Nevertheless, because we have been forced into a policy-making role of reacting to the problem of groundwater contamination after the fact, I do not see the Nation coming to grips with an effective national groundwater protection policy for a long time in the absence of a well-organized and pro-active effort at the Federal level.

I too support the view that the States are in the best management position to protect groundwater. I will go even one step further and say that local governments probably can do much of the actual protection of groundwater, with proper State and Federal guidance. Groundwater quality, behavior, and contamination are extremely localized phenomena, and it makes little sense for regulators in Washington to be telling the people of Tennessee or Pennsylvania, or the people in Northern New Jersey and Southern New Jersey, how to protect their groundwater, in view of the different groundwater conditions at each location. For groundwater contamination, it is a locally caused problem that can best be managed through a localized remedy.

However, I also support a strong leadership role by the Federal Government in establishing basic principles for protecting groundwater and in providing oral and written guidance to State and local governments for hands-on management of groundwater protection. In short, let the Federal Government set the baselines for protecting groundwater, but leave it up to the State and local governments to decide how they achieve that protection. I believe that the EPA Office of Ground-Water Protection in recent years has made a concerted effort to give the States the technical guidance they need, putting out numerous reports.

One of the things about environmental protection in general, and groundwater protection in particular, that has always amazed me is what I call the "Us and Them" attitude. I have witnessed friction among Federal Agencies and Congress, between individual Federal Agencies, among individual offices within a single Federal Agency, among Federal Agencies and the States, and among Federal and State Agencies and those they all work for, the American people. I think that sometimes we forget that we are all working toward the same goal--to protect groundwater--and I attribute this to a lack of coordination by all parties.

Let me give just one illustration. A key element of any groundwater protection effort is groundwater protection standards. In the context of environmental protection, "standards" are most often used to define an acceptable result of compliance with a regulation. They define the specific behavior, performance, or related state of nature that is expected to follow from compliance with that regulation. For groundwater, standards serve as the basis for prevention or cleanup of contamination.

EPA has no uniform standards for protecting groundwater. The Office of Drinking Water applies maximum contaminant levels (MCLs) to all public water supplies under the Safe Drinking Water Act; the Office of Solid Waste uses technology-based standards and also permits the use of less stringent alternate concentration levels (ACLs) at certain facilities; the Office of Emergency and Remedial Response must consider, by law, stringent maximum contaminant level goals (MCLGs) for Superfund cleanups, although it is proposing to use the less stringent MCLs; and the Office of Pesticides and Toxic Substances currently uses risk/benefit calculations and, under its new proposed pesticides in groundwater strategy, intends to use MCLs or, if none exist, MCLGs, de minimis standards (a risk level of 10^{-6} or set at the level of detection), and ecologically based protection criteria as necessary.

Although the Agency seems to be moving toward accepting the MCL as its groundwater protection standard, no clear Agency consensus has emerged. Last year, the debate over a national groundwater protection standard was raised to the interagency level involving some 12 Federal Agency offices with interest in groundwater. Although you may hear testimony that there already is an interagency committee on groundwater policy, in my opinion this group in fact was little more than an ad hoc task force for developing a position for supporting national groundwater legislation, which would have included the establishment of a groundwater protection standard. To the best of my knowledge, this interagency committee has met only four times and has not been active since December 1987. The committee also has not come to any consensus on national groundwater legislation or protection standards.

Therefore, if you are interested in the result of the lack of Federal coordination on groundwater protection, you have just to look at the issue of groundwater protection standards. There is no consensus across EPA's different programs, nor is there a consensus across the Federal Government. The question then emerges, "What kind of direction does this give to the States in their efforts to protect groundwater?"

The answer to the question is provided in the February 1988 report by the General Accounting Office (GAO) in its study of State activities against groundwater contamination. GAO found that 41 States have had to develop groundwater protection standards on their own; 16 States and territories have none. Except for the State standards that follow the Federal drinking water standards, there is little uniformity or consistency across the States. No two States have the same set of numeric standards (because of State-specific conditions), yet most of the States have called for interstate consistency.

GAO observed that, with potentially thousands of unregulated contaminants, there is considerable uncertainty about the extent to which groundwater is being protected in the United States. Aside from inconsistent signals from the Federal Government, the States have another hurdle to developing groundwater protection standards--lack of resources. For lack of funds, States do not usually conduct their own research on the toxicology of contaminants or on the risks of groundwater contaminants to health. They rely instead on information from the Federal Government. When it is not available, as is often the case, they must develop their own information, but this is duplicative when standards are developed for the same contaminant by more than one state.

In short, I think we need systematic coordination of Federal and State groundwater protection activities and policy-making--and I think we need it badly. The Federal Government has to move beyond its current disjointed activities--which have bred antagonism, turf battles, and secrecy--maximize its efforts and resources to protect groundwater, and share this expertise and information with State and local governments. After all, we are all in this together.

APPENDIX I

RECOMMENDED CHANGES TO S. 1992, AS INTRODUCED

Insert the following as a new Section 1:

SECTION 1. CONGRESSIONAL FINDINGS

Congress finds that:

(1) Groundwater is a valuable natural resource that provides over half of the general population and over 95 percent of the rural population of the United States with their drinking water;

(2) Groundwater is highly susceptible to contamination from many sources, natural and man-made;

(3) Once contaminated, groundwater is difficult, expensive, and often impossible to clean up;

(4) The value and complexity of groundwater demand that Federal Government protection programs should focus and coordinate their efforts to prevent contamination of groundwater;

(5) The Federal Government has substantial expertise and vast resources of information on the nature of groundwater and methods for protecting it;

(6) States and local governments should be the first line of protection for groundwater, complemented by Federal expertise and information;

(7) The public can voluntarily do much to help provide practical protection of groundwater, if properly informed; and

(8) The Federal Government should play a leadership role in providing expertise and information to the States, local governments, and the public to facilitate their efforts to prevent groundwater contamination.

Insert the following specific comments:

Overall goal of S. 1992 - To promote intergovernmental and interagency cooperation on groundwater protection and to facilitate the provision of practical information on groundwater protection to the public.

to Section 1 - (5) the term "practical groundwater information" means nontechnical guidance on preventive measures that can be taken to protect groundwater that do not require sophisticated expertise or equipment to accomplish.

to Section 2(a) - change the last sentence to read "The President shall also disseminate information on those activities to the appropriate Federal agencies, State and local governments, and the public.

to Section 2(b)(2) - (A) define and review the activities...

to Section 2(b)(2)(E) - ...by State and local governments and the public;

to Section 2(b)(2) (new subsection) - facilitate the development of memoranda of understanding among Interagency Committee members;

to Section 2(b)(2) (new subsection) - develop and facilitate the dissemination of practical groundwater protection information to the public;

to Section 2(b)(3) - ...and research needs of State and local governments and practical groundwater information needs to the public;

to Section 2(c)(1) - ...Each member shall have knowledge of groundwater issues and be selected from among State and local governmental officials of different geographic regions and from the public.

APPENDIX II

RESPONSES TO GROUNDWATER POLICY QUESTIONNAIRE

Question #1 - A more comprehensive Federal groundwater protection policy and better interagency and intergovernmental coordination have often been urged. Do you agree that S. 1992 addresses those needs?

The only "Federal" groundwater protection policy that I am aware of is EPA's 1984 Groundwater Protection Strategy, which although intended for adoption across the Federal Government, actually sets the policy solely for EPA's activities. However, the Strategy has not achieved uniform acceptance across all EPA programs.

Because no national groundwater policy currently exists, and in view of the fact that passage of national groundwater legislation is a long way off, I am in favor of any effort to improve the Federal and State roles and interaction in groundwater policy development. S. 1992 would require regular Federal Agency meetings to discuss priority issues for the States. Getting people together and talking about mutual concerns is an important first step toward developing a national groundwater policy, and I believe that S. 1992 would accomplish this purpose.

Question #2 - Would comprehensive Federal groundwater protection policy and the accompanying Federal oversight and guidance dilute or reinforce existing State and local policies?

A comprehensive groundwater strategy at any level of government generally encompasses four elements: (1) a policy position that defines the strategy's goals; (2) a management approach that sets priorities for regulatory and other actions; (3) a set of controls that define prevention and treatment technologies; and (4) the role each governing body is to play in carrying out the strategy. As one can imagine, a groundwater strategy is by design comprehensive.

However, to the extent that groundwater quality, behavior, and contamination are localized phenomena, groundwater can best be managed at a local level. For a Federal strategy to be effective, it should set the basis for State and local groundwater protection activities, but it must also be sensitive to the localized nature of the resource. Thus, the real challenge to any Federal effort in developing a national groundwater policy is to make it comprehensive enough to protect the resource, but also flexible enough to recognize the site-be-site efforts that State and local governments will have to perform to ensure an adequate level of protection.

On the question of Federal guidance, I believe that wha States need most to protect groundwater is information. EPA a the U.S. Geological Survey spend significant sums yearly for groundwater research ($30.5 million by EPA and $90 million by the USGS in FY 1987), but most of this money funds programs that are "law specific"; that is, they only serve the specific purposes mandated by each agency. If the Federal Government's role is to be a leader in groundwater research, it also should provide a central source of information, which would serve two purposes: it would give the States ready access to the latest technological and scientific data available, and duplication of research by different Federal Agencies would be avoided. EPA currently funds a National Ground Water Information Center and a National Ground Water Information Data Base through the National Water Well Association, and questions about its usefulness and accessibility have been raised.

On the question of congressional oversight, given the importance of groundwater to the Nation as a whole, it is imperative that Congress play a central role in reviewing the efforts of the Federal Government to develop groundwater policy and protect the resource. And, as proposed in S. 1992, the Federal Government should be reporting to Congress regularly on its groundwater activities.

Question #3 - If the primary responsibility for groundwater policy-making were to reside with the Federal Government, which agency(ies) should set it?

I believe that each Federal Agency involved in some aspect of groundwater management should be part of the policy-making effort. Actually, a more important consideration would be, "Which agency should lead the effort?" On this question, there are two answers, which are based on two broad functional areas of groundwater policy-making.

In my opinion, the two most prominent Federal Agencies involved in managing groundwater are EPA and the U.S. Geological Survey within the Department of the Interior. EPA is primarily a regulatory agency, charged with developing policies and regulations that implement environmental laws. The Agency also conducts applied research to support its regulatory activities. The USGS, on the other hand, is solely a research agency, charged with characterizing the water and land resources of the United States, which requires an effort of much different scale, purpose, and skills.

Thus, it may be appropriate to divide the national groundwater policy-making effort into two groups--groundwater protection policy, which would be chaired by EPA and focus on regulatory policy; and groundwater research, which would be chaired by the USGS and would focus on research policy. Regarding the overlapping roles of groundwater research between EPA and the USGS, I would recommend that EPA develop its own internal research policy and seek USGS's concurrence.

Question #4 - Cite any exemplary State, local, or Federal coordinated groundwater management efforts which you are aware of that could serve as a model for any future coordinated Federal interagency entity.

State groundwater management efforts that often are cited as well-developed include those in Arizona, California, Massachusetts, Colorado, Connecticut, Florida, Kansas, Montana, New Mexico, New York, New Jersey, Vermont, and Wisconsin. The most notable local efforts typically are the Dade County (FL), Cape Cod (MA), and Nassau and Suffolk Counties (NY). A noteworthy regional effort regards the New Jersey Pine Barrens, which is protected under State and Federal law.

Question #5 - Cite any examples of the inefficiency or ineffectiveness of Federal and State attempts to coordinate groundwater management efforts which you are aware of that serve to illustrate the need for change along the lines envisioned by S. 1992.

The lack of national groundwater quality standards and the subsequent impact on the States, as discussed in my testimony, is a good example of the lack of coordination.

Written Statement

of Alan P. Egler

The Chemical Manufacturers Association (CMA) is a nonprofit trade association whose member companies represent more than 90% of the productive capacity for basic industrial chemicals in this country. CMA's members use groundwater for several purposes and are subject to many Federal, state, and local programs relating to groundwater. Thus, CMA has a major interest in protecting groundwater as well as in the government programs which affect the resource. We appreciate this opportunity to share our thoughts on S. 1992 with the committee.

Groundwater is a vital natural resource. Apart from existing Federal statutes that regulate certain potential sources of groundwater contamination deemed to pose problems nationwide (e.g. RCRA and CERCLA), responsibility for managing and protecting this resource lies primarily with state and local governments. This makes sense given the local nature of the resource. It also has a strong legal foundation. States have always exercised primary jurisdiction over groundwater through state common law, state water resource law, state and local land use management laws, and the state programs authorized by these laws.

CMA believes that each state _should_ have a comprehensive groundwater management program that addresses conditions in that state. Several components that could be included in a state groundwater management program are: groundwater characterization; groundwater quality standards; groundwater protection; groundwater monitoring; groundwater remediation; and interstate cooperation issues. While CMA believes state programs _should_ address these issues, we do not believe the Federal Government should specify how states must address these issues. The role of the Federal Government in groundwater protection and management is and should remain to support states' groundwater activities. The type of support states should get from the Federal Government includes research, technical assistance and financial assistance.

Currently several Federal agencies under various statutory authorities conduct a limited amount of research relating to groundwater. To date, however, there is insufficient coordination of these research efforts and little focus and direction to the research.

Beyond basic research, the Federal Government provides some technical tools that states have utilized in their groundwater programs. However, these tools have not met the full needs of the states for technical assistance. For example, under the Safe Drinking Water Act, EPA promulgates health based standards to be applied to public drinking water supplies. Some states have applied these numbers to all groundwater, regardless of whether that water is destined for human consumption, simply because these numbers exist. (The Federal Government has been equally adept at applying these numbers outside of the context in which they were developed.) This suggests the Federal Government is not providing states the technical assistance needed to develop groundwater standards. Until the Federal Government does so, it will continue to perpetrate the misguided notion that all groundwater is drinking water. We cannot stress enough the importance of understanding that not all groundwater is used or, in fact, is usable as drinking water.

The states' emphasis on standards alone is also misguided. Groundwater standards, by themselves, provide no protection from contamination. They are merely tools, yardsticks if you will, to measure the performance of an overall groundwater protection program. Groundwater standards are only one element of a comprehensive state groundwater management program. The Federal Government could provide the states assistance in their standards programs. States also need assistance from the Federal Government to help them develop programs to characterize the resource, protect it, monitor it for contamination, clean it up, and to deal with interstate groundwater issues.

Any proposed Federal groundwater legislation, then, should encourage and enable states to develop effective groundwater programs. The Federal Government can and should provide specific tools to the states to protect groundwater resources. These would include:

- o technical and informational assistance in areas such as aquifer mapping and site investigation (i.e. valid hydrogeologic information);
- o criteria that will help states set groundwater standards; and
- o research into better technologies for groundwater investigations and cleanup efforts.

Any proposed Federal groundwater legislation should also focus and coordinate the resources of Federal agencies to more effectively assist the states in their groundwater program activities. S. 1992, introduced by Senators Heinz and Sasser, effectively addresses the current lack of coordination and communication between those Federal agencies with groundwater related activities (e.g. USDA, DOI, EPA and DHHS).

S. 1992 effectively addresses the need to improve coordination among Federal agencies and to improve communication between Federal agencies and the states by creating both an Interagency Committee on Groundwater Protection and an Advisory Committee on Groundwater Protection. The Interagency Committee would better manage and coordinate the activities of all Federal agencies engaged in groundwater research. The Advisory Committee would facilitate the vital communications link between those Federal agencies that conduct groundwater related activities and the state and local governments that bear ultimate responsibility for protecting and managing the resource. The bill recognizes the need for both interagency and intergovernmental coordination in this issue without superceding the primary responsibility of the states to manage their groundwater.

The importance of assuring consistency within the Federal Government's approach to regulating activities affecting groundwater (e.g. RCRA, CERCLA) cannot be underestimated. Similarly, the need for a broad, coordinated and non-duplicative Federal groundwater research and technical assistance program is critical. S. 1992 establishes the means to accomplish this. Through this bill, we can expect greater interagency consistency and interagency and intergovernmental coordination relating to groundwater.

Still, the hard work should not end here. S. 1992 could be even more effective by going beyond coordination of existing efforts toward addressing the needs of the states that the Federal Government is not currently meeting. For example, it could grant authority for USGS to provide essential hydrogeologic information to the states. It could provide authority for EPA to conduct more research on technologies for remediation of groundwater contamination and to develop criteria states can use to develop groundwater standards. It could provide the necessary authority for other Federal agencies to conduct needed research and technical assistance. To accomplish these tasks, S. 1992 would also need to provide the money necessary to implement this authority.

CMA supports S. 1992 and commends this subcommittee for recognizing and responding to the need for better coordination among Federal agencies addressing groundwater and for better communication between Federal and state governments with respect to groundwater protection needs. CMA believes this subcommittee could make this bill even more responsible and effective by making the improvements to this bill suggested in this statement. By providing state and local governments with what they need from the Federal Government, this bill would simultaneously serve as a model for future interagency and intergovernmental programs, and it would encourage and enable the states to provide broad protection for the groundwater resource.

PREPARED STATEMENT OF BRUCE R. LEAVITT

My name is Bruce R. Leavitt. I am a hydrogeologist with the Environmental Quality Control Department of Consolidation Coal Company and chairman of the American Mining Congress (AMC) Ground-Water Task Force. AMC is a national association of companies that produce most of the nation's supply of metals, coal and industrial and agricultural minerals. AMC is pleased to have this opportunity to express its views on the vital subject of ground-water protection.

Included with this testimony as attachments are "Responses of the American Mining Congress to the Senate Governmental Affairs Committee Ground-Water Questionaire"; three White Papers on Ground Water entitled Mining and Ground Water, Ground-Water Management: Federal & State Roles, and Ground-Water Management: Nondegradation vs. Management for Multiple Use, and a legal memorandum regarding federal versus state regulation of ground-water quality. I request that my statement, including these attachments, be printed in the record.

The American Mining Congress believes that judicious ground-water protection is vital to the health of our citizens and our economy. It is the "judicious" aspect of ground-water protection that I wish to address today.

Judicious protection and management of the ground-water resource should encompass the following principles:

- Both federal and state governments have legitimate roles to play in the protection of ground water. The roles should not be identical but should be synergistic. For a variety of reasons, which are articulated in the attached AMC ground-water white papers, the states should have the primary responsibility for managing and protecting ground water with the federal government providing financial and technical support.

- Comprehensive federal legislation is not needed to protect ground water. Sufficient protection authority exists in federal statutes and additional protection is emerging in the developing state programs. What is needed is wise and efficient implementation of existing statutory authority.

- No one federal agency possesses all the expertise and authority for ground-water protection. Several different federal agencies have responsibilities and legitimate roles to play in ground-water protection. There is need, however, for coordination among federal agencies and between the federal and state governments on ground-water matters to increase efficiency, reduce conflicting policies and eliminate duplication and overlap.

S.1992 is consistent with these principles and therefore AMC supports it. Specifically, the bill is consonant with the roles that the federal government and states should play in ground-water protection. Creating an Advisory Committee of State and Local Representatives recognizes the key role states have in protecting ground water. The interagency committee should enhance the federal government's role of providing the states with technical assistance, information, and research and development program support.

Also, the bill correctly avoids creating a new federal regulatory program. Instead it seeks to improve the implementation of existing statutory authority relating to ground-water protection.

Finally, the bill provides a straightforward mechanism and procedure for interagency coordination and elimination of duplication among federal programs.

There is a need for this legislation. Many examples could be cited of federal inefficiency and ineffectiveness regarding ground-water protection. For instance, the Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC) and the Department of Energy (DOE) have failed to adequately coordinate their ground-water protection efforts regarding uranium mill tailings sites. The Uranium Mill Tailings Radiation Control Act gives NRC authority for ground-water protection at active mill tailings sites in accordance with EPA established standards. The act gives DOE authority for cleanup and ground-water protection at inactive sites, also in accordance with EPA standards.

Although inactive and active sites are indistinguishable with respect to potential effects on ground water, EPA set different standards for each under the Mill Tailings Act. Subsequently, EPA promulgated a second ground-water regulatory program for uranium mill tailings under authority of the Clean Air Act, which fully overlaps and duplicates the NRC regime and creates a serious conflict between the two agencies. EPA issued this second program because it disagreed with certain aspects of NRC's implementation of the Mill Tailings Act, even though NRC was acting clearly within its statutory authority.

A bill such as S.1992 provides the forum for these three agencies to resolve their differences and coordinate their efforts in implementing their statutory authority for ground-water protection at uranium mill tailings sites.

A lack of coordination also exists with respect to existing federal data bases on ground water. This hinders good decisionmaking. In order to make a careful decision with respect to a particular site, all the various data bases must be searched. Under the current structure, considerable effort must be expended to obtain all of the existing data. Coordination is required between the federal agencies in order to create a unified data base that is easily accessible and contains the relevant information. This will eliminate the need for the existing data to be recompiled each time it is used.

Creating one comprehensive data base is an enormous undertaking that the federal government is best equiped to undertake. S.1992 provides a mechanism for working towards this goal, which can be achieved through sustained interagency coordination and effort.

Other examples of government inefficiency and confusion concerning ground water are described in our responses to the committee's questionnaire. Individually and collectively they point to the need for increased coordination among federal agencies and between federal and state governments, a goal S.1992 can help achieve.

AMC looks forward to working with the committee on this legislation. I will be pleased to respond to any questions you may have.

AMERICAN MINING CONGRESS RESPONSES TO SENATE GOVERNMENTAL AFFAIRS COMMITTEE QUESTIONNAIRE ON GROUND-WATER PROTECTION

MAY 18,1988

RESPONSE TO QUESTION 1

S.1992 provides for better interagency and intergovernmental coordination on ground-water protection. The bill's major thrust is coordinating ground-water activities of various federal agencies and enhancing their technical and informational assistance to the states.

Comprehensive coordination within the federal government is needed for the protection of ground water. What is not needed, however, is comprehensive control legislation. Sufficient authority to protect ground water already exists in federal statutes, including the Surface Mining Control and Reclamation Act, the Comprehensive Environmental Response, Compensation and Liability Act, the Superfund Amendments and Reauthorization Act, the Resource Conservation and Recovery Act, the Safe Drinking Water Act, the Clean Water Act, the Atomic Energy Act, the Uranium Mill Tailings Radiation Control Act, and the National Environmental Policy Act. We need wise and efficient implementation of these and other existing statutes with effective coordination among the federal agencies that administer them.

RESPONSE TO QUESTION 2

Whether a new federal statute providing for comprehensive ground-water protection policy and federal oversight would dilute or reinforce existing state and local policies depends on the specific nature of such a law. A research bill, such as H.R.791, poses little potential for undercutting, and in fact, would enhance existing federal and state ground-water protection programs. A new federal control bill, however, would create great potential for confusion and contradiction with existing programs.

Moreover, new legislative mandates may require reallocation of already scarce agency resources, drawing attention and support away from programs currently protecting the environment. Indeed, new federal authority could significantly delay ongoing state efforts to protect ground water while states struggle to reshape their individual programs to meet a uniform federal one.

Increased knowledge about the nation's ground-water resources will help strengthen and integrate federal and state protection programs. The mapping of aquifers, assessments of ground-water quality and quantity, studies of the fate and transport of contaminants, and risk assessment analyses for significant ground-water contaminants are all tasks that would complement and strengthen existing ground-water protection programs. S.1992 provides a framework for federal interagency coordination of such projects and for addressing state technical assistance, information, and research needs.

RESPONSE TO QUESTION 3

AMC supports the provision in S.1992 and H.R.791, that vests in the Office of the President authority for coordinating the federal government's ground-water activities. There are several different federal agencies with expertise, legislative authority and data on ground water, including the USGS, EPA and the U.S. Bureau of Reclamation. The Office of the President is the logical body to coordinate these various agencies. No one federal agency should set comprehensive federal ground-water protection policy, primarily because no one agency has responsibility for considering all the multiple uses which society demands from the ground-water resource.

It should be the national policy that individual states have the primary responsibility for ground-water protection and management. This point is discussed in detail in the attached white papers: Mining and Ground Water, Ground-Water Management: Federal & State Roles, and Ground-Water Management: Nondegradation vs. Management for Multiple Use.

RESPONSE TO QUESTION 4

The states are at the forefront in coordinating efforts for ground-water management. Two examples come from the Midwest. In 1986, Ohio adopted a comprehensive ground-water protection strategy. At that time the Cabinet Cluster on Water, which includes the Directors of Environmental Protection, Natural Resources, and Health were charged to oversee the implementation of the strategy. An inter-agency Ground Water Advisory Council was established to fill five functions:

- Advisory: The council serves to provide advice and direction to the Ohio General Assembly and to the state departments and agencies whose activities have current or potential impact on ground-water resources and their integrity.

- Coordination: The council serves to assist the agencies and other arms of government to coordinate their functions so that their combined actions will manage ground-water resources without conflict or duplication.

- Liaison: The council serves as a communication link among state agencies, the General Assembly, the public-at-large and private interests so that it can serve to promote the protection and management of ground water statewide.

- Forum: The council provides a structure and process whereby issues related to ground water and its protection may be aired and debated openly to bring about resolution and closure.

- Education: The council encourages programs to increase the awareness and knowledge of political and community leaders and the general public about the state's ground-water resources.

The Inter-agency Ground Water Council has identified the need for broader governmental involvement and has included representatives from the office of the State Fire Marshal. Interested parties from industry, environmental groups and the public-at-large are also involved through the council's extensive committee and subcommittee structure. Currently the council's committees are working on issues such as non-Superfund cleanup, wellhead protection, private water standards, underground storage tanks, ground-water classifications and DRASTIC, a system for ground-water vulnerability assessment. These issues go beyond existing federal programs and allow the state to coordinate a total ground-water protection effort.

Illinois is another Midwestern state that is doing an excellent job of coordination on ground-water issues. Every two weeks the Cabinet and Subcabinet hold meetings to review their activities relative to the state's ground-water program.

One activity is particularly noteworthy, both for its coordinational and educational aspects. In March of this year, a series of ground-water protection workshops were held in five locations throughout the state to discuss the provisions and impacts of the Illinois Ground-Water Protection Act which was passed last year. Fifty trade, professional and environmental organizations cosponsored the workshops, thus ensuring representation of a wide range of ground-water interests. Representatives from nine state agencies were on hand at each workshop to discuss the state law and regulations and answer questions. Each participant was given a binder full of pertinent information and agencies and organizations were invited to provide additional literature and displays.

RESPONSE TO QUESTION 5

There are many examples of inefficiency and ineffectiveness at the Federal level. Part of this inefficiency stems from congressional mandate and part from narrowly focused agency initiatives. The following are some examples:

- Uranium Mill Tailings

There has been a lack of coordination and thus confusion over the past several years among the Nuclear Regulatory Commisssion, the Environmental Protection Agency and the Department of Energy with respect to ground-water protection at uranium mill tailings sites. The Uranium Mill Tailings Radiation Control Act gives authority to NRC for ground-water protection at active uranium mill tailings sites in accordance with EPA established standards. The Act gives the Department of Energy authority for clean-up and ground-water protection at inactive tailings sites, also in accordance with EPA standards.

Although inactive and active sites are indistinguishable with respect to potential effects on ground water, EPA has set different standards for each. The agency also has ignored existing ground-water standards being applied at active sites by the NRC. Indeed, EPA, acting under authority of the Clean Air Act, has constructed another regulatory regime for ground-water protection that fully overlaps and duplicates the NRC regime for ground-water protection at active mill sites. See 52 Federal Register 43553,43556 (Column 3) (Nov. 13, 1987).

A bill such as S.1992 certainly increases the potential for coordination among these three federal agencies with respect to ground-water issues at uranium mill tailings sites.

- U.S. Geological Survey

The U.S. Geological Survey has conducted numerous field investigations of ground-water quantity and, more recently, of ground-water quality. There is a need for more interpretive studies of aquifer systems that will be useful in the management of the ground-water resource. States and industry experience frustration with the number of existing federal ground-water data bases. This lack of coordination of ground-water data hinders good decision-making. The USGS should develop an easily accessible data base that can be accessed by personal computers. The data base should be structured around a geographic information system that would make all data concerning ground water within a given geographic area available to the user. This type of system would promote data compilation as well as data accessibility, which will be necessary for any ground-water management program.

There is a need to increase the availability of federal ground-water data for use by states and the private sector. Reports from our member companies indicate that some federal ground-water studies, especially at the USGS, undergo interminable internal peer review before their release. Consequently, data critical to ground-water decision-makers are not available in a timely manner. In one case in the West, a company has been trying for two years to obtain a ground-water study dealing with one of its mining sites. Another USGS study that was performed at the request of a Pennsylvania county was completed in 1983. The USGS review was finally completed in 1987, but the report still has not been published by Pennsylvania.

- Environmental Protection Agency

EPA has established an Office of Ground Water Protection (OGWP) to develop a comprehensive protection strategy and coordinate the management of ground water among the various program offices. This effort is stymied, however, because the office lacks flexibility. It is constrained by the many different ground-water requirements in the existing statutes EPA administers. Because OGWP has no statutory authority of its own, the program offices are not obliged to adopt its recommendations.

While this scenario plays out within the agency, the various states are adopting the recommendations of OGWP, as contained in the Ground Water Classification Guidance Document, under the belief that consistency will be necessary for federal approval of state programs. For example, states are adopting the EPA classification scheme that, for all practical purposes, would prohibit coal mining. When this was pointed out to the agency, AMC was told that its concern was recognized, but because OGWP does not regulate ground-water effects of coal mining, it does not feel obliged to consider the impact of the guidance document on the industry. Further, EPA believes that it should not be held accountable for how the states are utilizing its document.

A further constraint on rational ground-water protection is EPA's single focus on the protection of drinking water. While sources of drinking water should be protected, protection cannot be separated from resource management, which recognizes that other uses of ground water are just as important to society as the drinking water use.

- Department of Agriculture

The Department of Agriculture (DOA) administers about two dozen agencies that establish rules that can effect ground water. At present there is little coordination between those different agencies. Budget cutting removed the Office of Environmental Quality Activities that had previously served that function. Recently a work group on agricultural chemicals has been established that is beginning to address ground-water coordination at DOA. Also, there is a need for coordination between DOA and EPA so that EPA does not establish rules which preclude reasonable agricultural practices.

MOSES, WITTEMYER, HARRISON AND WOODRUFF, P. C.

MEMORANDUM

TO: John A. Knebel, President
American Mining Congress

FROM: Moses, Wittemyer, Harrison and Woodruff, P.C.

RE: Potential Conflicts Between Federal Ground Water Quality Regulation and State Water Rights

DATE: August 14, 1987

I. ISSUE.

Whether the federal government or the states should have primary responsibility for ground water quality regulation.

II. SUMMARY OF CONCLUSION.

The states should have primary responsibility for ground water quality regulation. Ground water quality cannot be regulated without affecting the use of ground water. The federal government historically has deferred to state law regarding the allocation of water resources. Federal ground water quality regulation would unavoidably infringe upon state prerogatives in the allocation of ground water resources. Ground water characteristics and behavior are extremely complex, making the management of ground water and control of ground water pollution more complex and difficult than surface water. There are wide regional and local variations in hydrogeologic, climatic and other conditions influencing ground water quantity and quality. There are wide regional and local differences in the existing and future dependence on ground water, as well as in the legal systems controlling its use and quality. For these reasons, decisions with respect to the use, management and quality of ground water require site-specific information. Accordingly, the states should be more effective than the federal government in regulating ground water quality and in resolving the inherent conflicts between quality regulation and use of ground water.

III. DISCUSSION.

A. Background.

Ground water is water occurring in geologic formations (or "aquifers") having sufficient permeability and water content to yield usable amounts of water to wells or springs. These aquifers are present virtually everywhere in the United States, and constitute a significant water source for the full range of human activity. 1/ Dependence on ground water varies greatly in the United States from about 2% of total water use in West Virginia, Montana and Maryland to about 86% of total use in Kansas. 2/

Ground water systems are extremely complex, and are influenced by many local and regional factors. The sources, quantity, and quality of ground water vary widely from state to state and region to region. Aquifers consist of various geologic materials, including alluvial sands and gravels, sedimentary, metamorphic and igneous rock, each having different characteristics. Aquifers may be thick or thin, extensive or local, located near the surface or at considerable depths. 3/ Different aquifers have different characteristics and consequently different yields, water quality and suitability for particular uses. Such differences may occur within a single aquifer. Some aquifers are closely connected to surface water systems and others remotely connected, with resulting differences in rates of recharge and "mining" of ground water.

Legal rights to the use of ground water have been established for well over 100 years. 4/ A right to ground water is generally recognized to be a property right. 5/ Such water rights are entitled to the same constitutional protections as any other property right. 6/

The allocation of water resources, including ground water, has been left to the individual states, and the states have developed different legal systems governing such allocation. These systems can be categorized under four basic legal doctrines:

> Absolute Dominion. The landowner or person "capturing" the ground water may extract it for any purpose without limitation and may use it on or off the overlying land. 7/
>
> Reasonable Use or American Rule. A modification of the Absolute Dominion Rule which limits ground water use to reasonable uses on the overlying land. 8/

> Correlative Rights. The landowners hold essentially proprietary shares in the underlying aquifer in proportion to their ownership of the overlying land. In times of water shortage, water is allocated on a *pro rata* basis to overlying landowners. 9/
>
> Prior Appropriation. Ground water use is allocated in order of priority; that is, the most recently acquired water rights are curtailed in favor of senior water rights whenever shortages occur. 10/

The states' choices of ground water allocation rules generally are consistent with their rules for allocation of surface water. Non-appropriative approaches are generally preferred by states in the eastern United States under the first three allocation doctrines described above. 11/ These approaches are, in varying degree, extensions of the riparian doctrine to ground water.

Most of the western states have incorporated, in whole or in part, principles of the well-established prior appropriation doctrine into their systems for administering ground water use. All thirteen western states governed by the prior appropriation doctrine provide for integrated management of hydrologically connected surface and ground waters. 12/ It should be noted that several states have also adopted special laws and regulations for management of particular aquifers. 13/

These different methods of allocating both surface and ground water have been a product of the differing conditions, customs and needs prevailing in the various states. While riparian based systems originally were developed in the humid regions of the eastern United States, the prior appropriation system generally was determined to be more suitable in the arid and semi-arid West. 14/

Historically, the allocation of water resources has been considered the exclusive province of the states. For well over 100 years, there has been a "consistent thread of purposeful and continued deference to state water law by Congress." 15/ This deference to state control of water rights is evidenced in statutes governing numerous federal programs. Although mining law and water law developed together in the West in the mid-1800's, with respect to federal lands, Congress chose to subject only mining to comprehensive federal control. In the 1866 and 1870 mining laws, Congress expressed its intent that private water rights on federal lands were to be governed by state and local laws and customs. 16/

The federal policy of deference to state water law continued in the various statutes opening and encouraging settlement of the western states. In California Oregon Power Co. v. Beaver Portland Cement Co., 17/ the Supreme Court discussed this historic relationship in regard to the Desert Lands Act of 1877 18/:

> What we hold is that following the Act of 1877, if not before, all nonnavigable waters then a part of the public domain became publici juris, subject to the plenary control of the designated states, including those since created out of the territories named, with the right in each to determine for itself to what extent the rule of appropriation or the common-law rule in respect to riparian rights should obtain. For since "Congress cannot enforce either rule upon the state", State of Kansas v. Colorado, 206 U.S. 46, 94, 27 S.Ct. 655, 666, 51 L. 956, the full power of choice must remain with the state. 19/ [Emphasis added].

Consistent with this are the provisions of the Reclamation Act of 1902. That Act authorized the Secretary of the Interior to construct and operate water projects on federal lands. However, the Act (Section 8) expressly provided that it did not affect "or in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder", and required the United States to "proceed in conformity with [state] laws". 20/ The Supreme Court has consistently construed that provision to mandate federal compliance with state water laws, except where "inconsistent with express federal directives" authorizing the federal project. 21/

The McCarran Amendment 22/ is a further clear example of Congress' deference to state water laws. It provides that the

United States may be joined in suits for the adjudication or administration of rights pursuant to state law where it is the owner of or is in the process of acquiring water rights. There have been at least 37 federal statutes in which Congress has expressly deferred to state water laws. 23/ This historic relationship between the federal government and the states, which has been reaffirmed by Congress and the courts over many years, could be threatened by a federally dominated program for the regulation of ground water quality. Because of the close relationship between ground water quality regulation and ground water allocation, and because of the inherent conflict between the two, such a federal program would unavoidably infringe upon existing state prerogatives in the allocation of ground water resources.

We recognize that there currently is limited federal involvement in ground water quality regulation through piecemeal legislation targeted at particular aspects of the overall problem. The Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation and Liability Act, and other federal statutes all touch on portions of the ground water pollution problem. 24/ While these statutes provide a role for the states, the important question is whether the federal government or the states will have primary responsibility for comprehensively addressing ground water quality problems. Most of the states have enacted legislation or taken steps to address ground water quality problems. 25/

B. Potential Conflicts Between Federal Water Quality Regulation and State Allocation of Water Resources.

It is well established that quantity and quality of ground water are intimately related. 26/ It is doubtful that a federal ground water quality regulatory program could be tailored so as to be sufficiently sensitive to and respectful of each state's laws for the allocation of ground water. A regulatory scheme that may be in harmony with one state's laws may conflict with those of another state. For example, limitation or reduction of existing pumping from a particular aquifer may be necessary to avoid increasing the concentration of existing contaminants in the aquifer. Such regulation could be considered a compensable taking in a state following the "absolute dominion", or rule of capture, doctrine, whereas it might be considered to be within the limits imposed by the "reasonable use" rule in states following that doctrine. Such regulation would affect individual water users differently in a "correlative rights" state, where all users would bear the reduction pro rata, than in a "prior appropriation" doctrine state, where only junior users would be curtailed.

If in the above situation it were instead determined that pumping limitations would apply only in certain areas of the aquifer, a different conflict would arise. This situation could occur where it is desirable to create a ground water "barrier" to prevent the migration of contaminants into other areas of the aquifer. 27/ To maintain the barrier, pumping would be permitted only in authorized areas of the aquifer. If the aquifer were in an appropriation doctrine state, a conflict between junior and senior users could arise. The senior user might not be allowed to pump because his well drew from the barrier area, while the junior might be allowed to pump because his well did not affect the barrier. Although sufficient water supply may exist, the senior water user would be prevented from exercising his valuable senior water right. Again, the users of the aquifer would be affected differently, depending on the allocation system followed by the state.

Whether particular ground water regulation is imposed by the federal government or by a state, inherent conflicts exist between such regulation and ground water allocation. Curtailment of pumping to avoid increasing the concentration of existing contaminants (or natural constituents such as salts) directly affects allocation of the resource. The prohibition of discharge of certain pollutants to a presently unused aquifer effects an allocation of the water to certain uses, just as the permitting of a discharge does so by making the aquifer unsuitable for certain uses such as drinking water. Aquifer classification according to existing or potential future uses in effect allocates the use of the resource. In short, ground water quality cannot be regulated without making decisions that effectively allocate use of the resource. Again, this is true whether the federal government or the states are responsible for the regulation. The question is whether the federal government or the states should be primarily responsible for making such decisions.

C. Federal v. State Responsibility for Ground Water Quality Regulation.

The protection of ground water quality should be an important nation-wide goal. Dependence on ground water is significant and increasing. There is increasing awareness of the particular value of ground water as a supplement to surface supplies and as a more reliable source of water in times of shortage than many surface water sources. There is increasing understanding that over time virtually all ground water is connected to surface water sources. There is increasing awareness of the reality that virtually all containers eventually leak. There is increasing recognition of the difficulty and complexity both of preventing ground water pollution and controlling it after it occurs. 28/

But, aside from the policy question of whether it is more appropriate for the federal government or the states to have primary responsibility for ground water quality and for resolving the inherent conflicts between ground water quality regulation and ground water allocation, the question is which can be more effective. Protection of ground water aquifers from pollution requires technological controls and monitoring, which to be effective must be adapted to site-specific conditions and aquifer characteristics. 29/ In this respect, the federal government is somewhat handicapped by its remoteness from local conditions.

Because effective protection and management of ground water aquifers is dependent on and sensitive to local aquifer characteristics and other local conditions, the states should more effectively be able to carry out primary responsibility for regulation of ground water quality. Additionally, state agencies should be more able to address and resolve the conflicts between ground water quality regulation and ground water rights, including the attendant local political and economic issues. The states have closer ties with the localities whose health and economic welfare may be affected by ground water quality regulation. To the extent that ground water quality regulation affects land use, such considerations can be more effectively addressed by the states.

While we think the states should have the primary responsibility for ground water quality regulation, the federal government has an important role to play. The government has the existing resources, through such agencies as the U.S. Geological Survey and the Bureau of Reclamation, to provide necessary technical expertise and assistance in ground water monitoring, development of pollution control and clean-up technology, and in other areas.

ENDNOTES

1. EPA Ground Water Protection Strategy (Aug. 1984) [hereinafter EPA Strategy].

2. Pye, Veronica I., Groundwater Contamination in the United States (1983), at fig. 3-93.

3. Id. at 29-32.

4. See, e.g., Chatfield v. Wilson, 28 Vt. 49 (1856).

5. Brighton Ditch Co. v. City of Englewood, 124 Colo. 336, 257 P.2d 116 (1951).

6. Clark, R. E., Water and Water Rights § 53.2 (1967).

7. See e.g., Tex. Water Code Ann., Tit. 4, § 52.002.

8. See, e.g., City of Pasadena v. City of Alhambra, 33 Cal.2d 908, 207 P.2d 17 (1949).

9. See, e.g., Bristor v. Cheatham, 75 Ariz. 227, 255 P.2d 173 (1953); In re Metropolitan Utilities District of Omaha, 179 Neb. 783, 140 N.W.2d 626 (1966); and Beeth v. Hoisveen, 157 N.W.2d 728 (N.D. 1968).

10. See, e.g., Alaska Stat. § 46.15.040; Kan. Stat. Ann. § 82a-701, et seq. (1963); Nev. Rev. Stat. § 534.010; N. Mex. Stat. Ann. § 72-12-1 (1978); N. Dak. Cent. Code § 61-04-01.2; Okla Stat. Ann., Tit. 82, § 102.01, et seq.; Ore. Rev. Stat. § 537.505; S. Dak. Comp. Laws § 46-6-1, et seq. (1967); Utah Code Ann. § 73-1-1, et seq. (1953); Wash. Rev. Code Ann. § 90.14; and Wyo. Stat. Ann. § 41-3-901, et seq. (1977).

11. Murphy, Earl F., The Recurring State Judicial Task of Choosing Rules for Groundwater Law: How Occult Still?, 66 Neb. L. Rev. 120, 134 (1987).

12. Grant, Douglas L., The Complexities of Managing Hydrologically Connected Surface Water and Groundwater Under the Appropriation Doctrine, 20 Land & Water L. Rev. 63, 64-65 (1987).

13. See, e.g., Colo. Rev. Stat. Ann. § 37-90-137 (1973), as amended, which governs treatment of the Denver Basin aquifer.

14. *Irwin v. Phillips*, 5 Cal. 140 (1855); *Coffin v. Left Hand Ditch Co.*, 6 Colo. 443 (1882).

15. *California v. United States*, 438 U.S. 645 (1978).

16. *Andrus v. Charlestone Stone Products Co., Inc.*, 436 U.S. 617 (1978); *Broder v. Natoma Water and Mining Co.*, 101 U.S. 274 (1879).

17. 295 U.S. 142 (1935).

18. 43 U.S.C. § 321 (1982).

19. 295 U.S. at 163-64.

20. 43 U.S.C. § 383 (1982).

21. *California v. United States*, *supra*; *Nevada v. United States*, 463 U.S. 110, 122-25 (1982); *Nebraska v. Wyoming*, 325 U.S. 589, 612-15 (1945).

22. 43 U.S.C. § 666 (1982).

23. *See United States v. New Mexico*, 438 U.S. 696, 702 at n.5 (1978).

24. Safe Drinking Water Act, 42 U.S.C. §§ 300f to 300j-10 (1982), amended by Pub. L. 99-339, 100 Stat. 642 (1986); Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6991i (1982 and Supp. III 1985); Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§ 9601-9657 (1982); Toxic Substance Control Act, 15 U.S.C. §§ 2601-2629 (1982); Surface Mining Control and Reclamation Act, 30 U.S.C. §§ 1201-1328 (1982). We also note that the Seventh Circuit in *U.S. Steel v. Train*, 556 F.2d 822 (7th Cir. 1977), has held that the scope of the Clean Water Act, 33 U.S.C. §§ 1251-1376 (1982), applies to ground water. However, a split of authority exists on this point, as the Fifth Circuit in *Exxon Corp. v. Train*, 554 F.2d 1310 (5th Cir. 1977), on the basis of certain legislative history, came to the opposite conclusion.

25. *EPA Strategy*, *supra* note 1.

26. *Pye*, *supra* note 2 at 269.

27. Developing a ground water "barrier" was one solution proposed to stop the spread of contaminants by the ground water flow from Rocky Mountain Arsenal in Denver, Colorado. *Rocky Mountain Arsenal; Landmark Case of Groundwater Polluted by Organic Chemicals, and Being Cleaned Up*, Civil Engineering, Vol. 51, at 68 (September, 1981).

28. EPA has expressed doubts about its level of knowledge and "contends that monitoring ground water is more complex than anyone first thought". 4 Hydata 2.

29. *Murphy*, *supra* note 6 at 137.

ENVIRONMENTAL ISSUES
INSIGHTS

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Mining & Ground Water

Proper management of ground water has become an important societal goal. Sharing this goal, the American mining industry takes seriously its responsibility to protect the Nation's ground-water resource and those who use it. This paper is the first in a series on the relationship between mining and ground water and other issues related to the development of a reasonable ground-water management strategy.

Ground water and minerals are two of our most important natural resources. Ground water is used for drinking water, the irrigation of crops, the watering of livestock, and in a number of industrial processes, including the production of minerals. Mineral resources constitute the basic raw materials from which manufactured goods are made, supply energy to industry and our homes, and provide essential nutrients for agriculture.

Both ground water and minerals occur in a variety of geologic settings. Both vary greatly in quantity and quality from one location to the next. In addition, they often occur together—mineral deposits are often closely associated with aquifers. When this occurs, it is not always possible to obtain maximum use of both resources; development of one may limit or sometimes preclude development of the other.

This paper reviews some essential attributes of ground water, mineral resources, and mineral extraction. It discusses the interrelationship between mineral and ground-water resources, how the development of one may affect the other and how these effects are controlled and mitigated. It suggests a resource management strategy.

The volume of water contained in the soils and rock formations beneath the surface area of the United States has been estimated to range from 50 to 100 quadrillion gallons. According to the U.S. Geological Survey, probably more than half of the total volume represents deep-lying saline water currently believed to have little or no potential for development.[1] Of the accessible ground-water supply, only a small portion—about 89 billion gallons per day—is removed for human use. This usage rate amounts to about one-tenth of the total volume of water flowing through the Nation's ground-water system on the average day. On a daily basis, ground water provides about one-fourth of the fresh water used in the United States (see Figure 1).

Figure 1

FRESH WATER USED IN UNITED STATES*

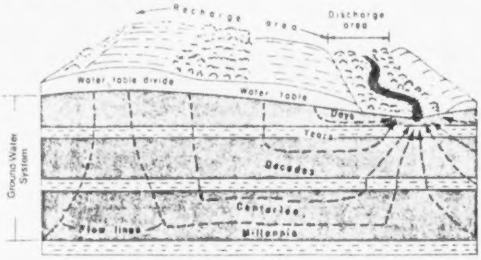
CATEGORY	Ground Water	[%]	Surface Water	[%]	Total
Rural Domestic & Stock	4.5	[00.4]	1.1	[19.6]	5.6
Irrigation	60.0	[40.0]	90.0	[60.0]	150.0
Public Drinking Water	12.0	[35.3]	22.0	[64.7]	34.0
Self-Supplied Industrial	12.0	[6.6]	170.0	[93.4]	182.0
Total	88.5	[23.8]	283.1	[76.2]	371.6

** In billions of gallons per day*

NOTE: Percentages are based on the category [row] total. Natural ground-water quality can vary widely between freshness and salinity.

Ground water withdrawn by man has many important uses. The largest single use in the United States—nearly 70 percent of withdrawals—is for irrigation. In 1980, 60 billion gallons of ground water a day were used for this purpose. The second largest use—

Figure 2 The Ground-water System



accounting for just over 15 percent of withdrawals—is for drinking water. This includes potable water from public supplies and private supplies in rural areas used for domestic purposes. Ground water is especially important in rural areas, where it supplies about 97 percent of total drinking water needs.[2] By comparison, for the United States as a whole, ground water supplies about 50 percent of total drinking water. Industrial uses, not including the generation of thermoelectric power, account for about 12 percent of total withdrawals of ground water.[3]

Ground water as an environmental medium has some unique characteristics that distinguish it from other media, such as air and surface water. For instance, direct human contact with air and surface water is more or less a routine occurrence. Thus, the effect of man's activities on these media is of widespread concern. In contrast, many ground-water aquifers lie at various depths of hundreds to thousands of feet below the surface and may never come in contact with human, plant or animal receptors. Because of this variation in likelihood of contact, all ground waters do not pose the same potential to affect human health.

The rate of movement is another important factor distinguishing ground water from other environmental media. Both air and surface water are constantly shifting, mixing and cycling through the environment. Surface water can move at a rate of many *feet per second*. Although these processes also occur for ground water, the cycle is much slower. In some cases, such as in deep aquifers, tens of thousands of years can pass between the time rain or snow reaches the aquifer and the time it returns to the surface (see Figure 2). Typically, ground-water movement is measured in *inches or feet per day*.

The permeability, or hydraulic conductivity, of the rock or soil through which the ground water flows is the major determinant of rate of movement. In an unfractured igneous rock or a shale, the ground-water flow rate may be as low as a few inches per year. Because of this slow movement, and resultant limited mixing, ground water is more of a localized medium than air or surface water. A large aquifer that extends for hundreds of miles may simultaneously support many different uses, none of which interferes with the other.

The qualities of air and surface water and the factors affecting them are relatively easy to observe. The characterization of ground water, however, is made difficult not only because of its inaccessibility, but also because it is affected by a diversity of natural processes. For example, ground water is filtered as it moves through the soil by natural physical, chemical and biological processes. Dissolved or suspended constituents in the water may adhere to rock and soil, or may be retained in pore spaces, and not be transported long distances. Soil and rock constituents can also chemically change ground-water contents through natural degradation, precipitation, sorption, and oxidation.

The quality of ground water varies greatly from one locale to another, not only as a result of the activities of man but also as a result of the natural environment of an aquifer. The characteristics of the water itself—hardness, pH, specific electrical conductance, and total dissolved solids—are major determinants of its quality. In addition, many natural inorganic elements are commonly found in ground water. All of these factors must be understood before appropriate decisions can be made regarding the use of a ground-water resource.

Generally, ground-water quality becomes a factor affecting the public health only when the water is withdrawn from the ground or flows into surface water. Unlike air or surface water contamination problems, the localized nature of ground-water problems usually confines the risk to a restricted area and allows time for the development of appropriate responses.

The unique characteristics of ground water discussed above, as well as its interrelationships with other resources, must be accounted for in any management strategy. Current federal air and water regulatory programs may provide insights into the development of ground-water management schemes, but they cannot accommodate the need for site-specific decisionmaking that ground-water management demands. This can best be done at the state level under a highly flexible system of regulation.

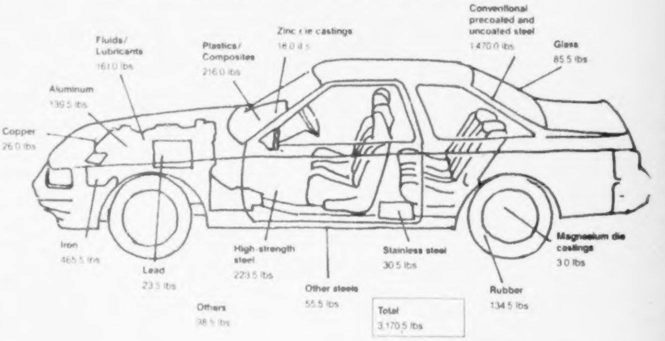
Although not widely recognized, almost every U.S. industry is dependent on mineral commodities to some degree. Agriculture depends on farm machinery made of metals and uses fertilizers comprised of minerals; industrial activities such as transportation, manufacturing, construction and communications—all rely on minerals. For example, an automobile contains about 15 different mineral materials, and still other minerals are essential to the manufacturing process (see Figure 3).

Similarly, minerals play a key role in all energy generation. Coal provides fuel for generation of much of the Nation's electricity. It is also the fuel used by a large segment of the manufacturing industry and is essential to steel making and other industrial processes. Uranium is the fuel source for atomic power production. Aggregates are required for concrete used in many hydroelectric projects.

Minerals are important commodities in world trade. The United States alone exported raw and processed minerals valued at about $24 billion in 1986. They are economically significant. The total value of nonfuel minerals mined in the U.S. alone in 1986 was about $23

Figure 3

The content of America's cars



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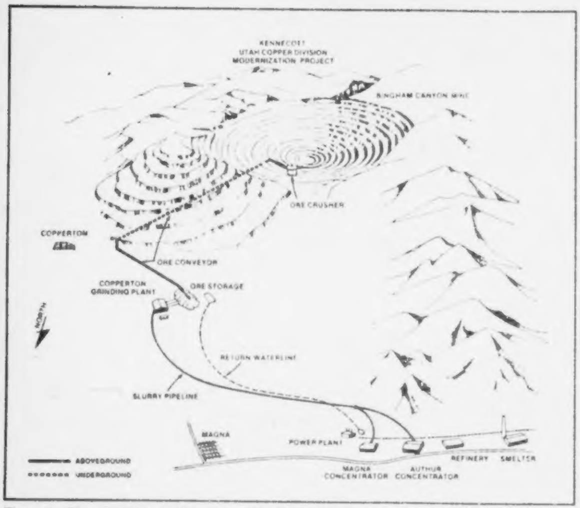


Figure 4 Open Pit Mine and Processing Facilities

billion, and the value of processed materials made from these ores was about $240 billion.[4] The value of coal produced in 1986 was an additional $22 billion. These raw materials and the goods produced from them are indispensable contributors to our Gross National Product.

MINING

Supplying the demand for minerals is not an easy or simple undertaking. The mining industry is different from other industries in that it cannot choose where to locate its facilities; it can only mine where the mineral is deposited. The earth's resources are scattered and typically not found where the demand for them is greatest.

Mining is accomplished through surface and underground mines, as well as in situ recovery methods. For surface and underground mining, large quantities of soil, sand, and rock are removed to access minerals deposited at the site (see Figures 4 and 5). In situ operations, which are designed to minimize surface impacts, involve injection of fluids into the mineralized zones to dissolve the minerals in place and subsequent withdrawal of the pregnant solution for further processing.

Processing facilities are generally located near the mines. The mined rock is first reduced in size through crushing and grinding. For metals recovery, the crushed rock is then submitted to chemical processing to separate out the valuable mineral. Because in metal mining the useful mineral usually constitutes less than one percent of the weight of the material mined (see Figure 6), the processing produces large volumes of waste material (often called "tailings"). The tailings may be reclaimed in place or pumped from the mill to tailings disposal areas in the form of a slurry. The water is then drawn off and recycled. Tailings ponds and waste piles may cover hundreds of acres at a mining site.

Coal processing after the crushing step involves washing to remove impurities. Coarse refuse, such as shale and clay, is separated out and transported to a disposal pit. The fine refuse is slurried to a settling pond where the "fines" are separated by gravity, and the clarified water is recycled to the washing plant or discharged. Coal settling ponds and refuse pits, while usually not as large as tailings ponds in metallic ore operations, also cover significant acreage.

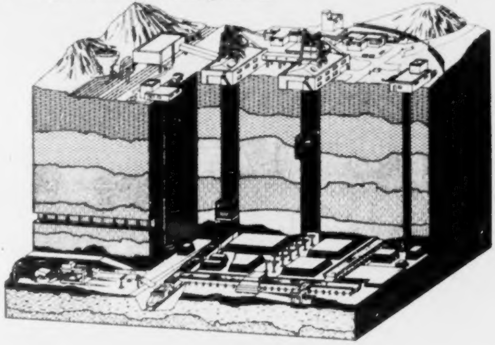
In situ operations may require processing of the recovered injection fluids, but do not usually involve significant additional physical modifications of the hydrologic environment.

Ground water may be used in mining operations for a variety of purposes, including extraction, processing and reclamation. Some water is consumed through evaporation associated with water handling, some is recycled for continued use, and some is discharged and made available for other surface users.

Even in the absence of direct "use," the mining and processing of minerals affects ground water to some degree. The nature of the effect, however, depends on many site-specific factors, including the type of mineral being mined, the geology of the deposit, the type of mine (surface, underground or in situ), and regional characteristics, such as climate and hydrogeology.

Excavating the mine itself may affect the ground water around the mine. The most obvious effect is that ground water flows into the mine, which then must be dewatered. This changes the level of ground water in the portion of the aquifer where the mine is located. Mining also breaks up the rocks that contain the minerals, exposing fresh rock surfaces to the weathering process. This can accelerate or alter natural changes in the water chemistry. Further, because

Figure 5 Underground Mine & Processing Facilities



mining occurs in heavily mineralized areas, it is not unusual to find elevated concentrations of minerals occurring naturally in the ground water intercepted by the mine.

Infiltration of surface water into waste piles at the mine site can dissolve minerals and transport them to aquifers. In certain situations, the leachate can make localized portions of aquifers acidic, metallic or salty, rendering them unsuitable for some uses. Large impoundments of slurried tailings may lead to percolation of some dissolved minerals into ground water, rendering it unsuitable for human use.

The impacts associated with mining, unlike those of many other industrial activities, seldom pose a serious threat to human health. In 1985, the U.S. Environmental Protection Agency completed a study and report to Congress on mining wastes.[5] The report noted that most mine wastes do not present the kinds of hazards usually associated with "hazardous wastes" and that the remote locations of most mines minimize impacts on people and drinking water.

MINIMIZING THE EFFECTS

Effective site-specific types of control measures do exist and are used routinely in the mining industry to ensure that the effects of mining are confined to as small an area as possible. Furthermore, mine operators generally recycle and reuse water to the maximum extent possible. "Zero discharge" of industrial wastewater and hence pollutants is achieved in some operations, especially in arid and semi-arid areas of the country, where conservation of water is an economic necessity.

Control measures begin at the mine itself. For example, water that is pumped out of the mine during dewatering is only discharged in compliance with applicable discharge limitations. To minimize the amount of water coming in contact with active surface operating areas where it could pick up contaminants, perimeter ditches are built to divert storm-water runoff. Runoff that cannot be diverted is collected and treated or recycled.

At the mill, processing wastes are placed in settling tanks to consolidate the solids. The tanks are inspected and maintained periodically to prevent leakage. The consolidated tailings are then pumped to tailings impoundments, which are sometimes built with subdrains or pump-back systems to collect remaining process water and recycle it.

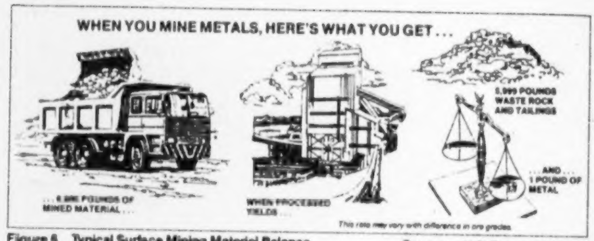

WHEN YOU MINE METALS, HERE'S WHAT YOU GET . . .
. . . 6,000 POUNDS OF MINED MATERIAL . . .
WHEN PROCESSED YIELDS . . .
5,999 POUNDS WASTE ROCK AND TAILINGS
. . . AND . . . 1 POUND OF METAL
This ratio may vary with difference in ore grades.

Figure 6 Typical Surface Mining Material Balance **Source: U.S. Bureau of Mines**

In heap or dump leaching operations, impermeable pads are built to hold the processing piles of ore, preventing migration of the leach solution off site and allowing full recovery of the valuable dissolved minerals. This is done for economic as well as environmental reasons.

The efficacy of all these protective measures is often checked through periodic monitoring of the ground water during the life of the mine operation. Once the ore deposit has been mined out, further measures are taken to protect the environment. Reclamation techniques such as selective placement of overburden, grading, revegetation and the application of acid-neutralizing chemicals reduce the possibility of continued changes in ground-water quality. Monitoring can then be continued to ensure that these techniques are working.

Mining is vital to the continued well-being of our society. It is an essential development of a natural resource. Where mining is involved, land- and water-use considerations cannot be separated. Mining by its nature may both consume and affect the quality of ground water in a particular location. The decision to develop the resource is also a decision to allocate the site's ground water. This means some ground water may no longer be available for other uses in that location. It does not necessarily mean that other uses of the ground water cannot occur in nearby portions of the same aquifer. As an essential activity, mining's use of ground water is a beneficial use. The effects of mining on ground water are the consequence of an allocation of the affected water to one use over others. Planners and regulators make such choices constantly, as when they set aside a plot of land for housing, thus removing it from use as cropland. In this respect mining is no different than other economically vital activities.

Crop irrigation provides a helpful analogy. Irrigation is an activity that has both a beneficial effect on society and an undesirable impact on ground water. The beneficial use is associated with plants that consume the water. The undesirable effect derives from the build-up of salts in the soil and the ground water. This undesirable effect arises from the nature of the irrigation process itself and is essentially unavoidable. Our natural resources such as ground water and minerals are intertwined in nature. It is important to emphasize that the decision to develop minerals does not mean the squandering of the ground-water resource; it is rather an allocation of that resource to one beneficial use over other such uses.

Ground water and minerals are both vitally essential to our lives on this planet. One resource cannot be protected to the exclusion of the other. If we are to maintain ourselves as a society, we must learn to balance the need to extract the earth's minerals necessary to sustaining life while guarding the biosphere that makes our lives possible. The American mining industry is committed to help strike that proper balance. In developing a management strategy, it is essential to recognize the unique and complex nature of our ground-water resources. This is best done through a highly flexible system of guidelines with primary responsibility for decisionmaking based at the state level.

[1] Testimony by Phillip Cohen, Chief Hydrologist, U.S. Geological Survey, before the U.S. Senate Environment & Public Works Committee, Toxic Substances & Environmental Oversight Subcommittee (June 17, 1985).

[2] E. Chase, W. Mann IV and W. Solley, *Estimated Use of Water in the United States in 1980*, U.S. Geological Survey Circular 1001 (1985).

[3] Ibid.

[4] Bureau of Mines, U.S. Department of the Interior, *Mineral Commodity Summaries 1985* (1985).

[5] EPA Report to Congress, *Wastes from the Extraction & Beneficiation of Metallic Ores, Phosphate Rock, Asbestos, Overburden from Uranium Mining, & Oil Shale*, (December 31, 1985).

ENVIRONMENTAL ISSUES
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Ground-Water Management:
Federal & State Roles

Proper management of ground water has become an important societal goal. Sharing this goal, the American mining industry takes seriously its responsibility to protect the nation's ground-water resource and those who use it. This paper is the second in a series on the relationships between mining and ground water and other issues related to the development of a reasonable ground-water management strategy.

As federal ground-water legislation has been considered in the U.S. Congress, one issue under debate has been what the proper roles of the states and the federal government should be regarding ground-water protection. This paper presents the mining industry's view, which is that the states should have the primary responsibility for managing and protecting ground water with the federal government providing financial and technical support.

When it comes to ground water, the states are much better suited than the federal government to take primary responsibility for protection and management of the resource. There are at least two major reasons for this: the localized nature of ground water, which does not lend itself to uniform federal regulations; and the inseparability of land- and water-use decisions involving site-specific considerations best handled at the state and local level.

Uniform federal standards, similar to those provided for in the Clean Air and Clean Water Acts, have been suggested for regulating ground water.[1] Technically, this approach is inappropriate. Ground water does not exhibit uniform characteristics, and it differs in certain important ways from surface water and air. In many respects ground water is a localized medium, subject to local variations in quantity, quality and importance relative to other competing demands of the community.

Specifically:

- The occurrence of ground water varies substantially from area to area, depending upon geographic, geologic and climatic conditions.[2]
- The natural background quality of ground water varies from area to area, for similar reasons.[3]
- The importance of the resource also varies substantially from area to area depending upon current and expected population density, the availability of alternative resources and the nature and importance of potentially conflicting land uses.[4]

In light of these characteristics of ground water, state and local governments are best able to strike the proper balance among competing needs. National uniform regulation could not provide the flexibility necessary to account for local and regional variations and conditions.

The above-described diversity in the ground-water resource is accounted for in differences among state laws controlling the allocation of water rights and the protection of water quality. The differences are not random, but reflect the needs and desires of the states based on their own unique circumstances.

By its very nature, ground water is linked to the land. Hence land-use and water-use decisions are inseparable. Land-use planning and decisionmaking traditionally have been roles assumed by states, not the federal government. Similarly, the allocation of water resources historically has been considered the exclusive province of the states. For well over 100 years, there has been a "consistent thread of purposeful and continued deference to state water law by Congress" (*California* v. *United States*, 438 U.S. 645 (1978)). This deference to state control of water rights is evidenced in federal statutes. For example, in the 1866 and 1870 mining laws, Congress expressed its intent that private water rights on federal lands be governed by state and local laws and customs (*Andrus* v. *Charlestone Stone Products Co., Inc.*, 436 U.S. 617 (1978); *Broder* v. *Natoma Water and Mining Co.*, 101 U.S. 274 (1879)). There have been at least 37 federal statutes in which Congress has expressly deferred to state water laws (*United States* v. *New Mexico*, 438 U.S. 696, 702 at n.5 (1978)).

This historic relationship between the federal government and the states, which has been reaffirmed by Congress and the courts, could be threatened by a federally dominated program for regulation of ground-water quality. Because of the inextricable link between quality regulation and allocation, such a federal program would infringe unavoidably upon existing state prerogatives in the allocation of ground-water resources.

It is doubtful that a federal ground-water quality regulatory program could be made sufficiently sensitive to each state's laws for the allocation of ground water. For example, reduction of pumping from a particular aquifer may be necessary to avoid increasing the concentration of contaminants in the aquifer. Such regulation could be considered a compensable taking in a state following the "Absolute Dominion" doctrine,[5] whereas it might be considered within the limits imposed by the "Reasonable Use" rule[6] in states following that doctrine. Such regulation would affect individual water users differently in a "Correlative Rights" state,[7] where all users would bear the reduction *pro rata*, from a "Prior Appropriation" doctrine state,[8] where only users with junior (lower priority) rights would be curtailed.

A different conflict could arise if pumping were limited in certain areas of the aquifer to create a "barrier" preventing migration of contaminants into other areas. In an appropriation-doctrine state, a conflict between junior and senior water users could arise, the senior being prohibited from pumping because his well drew from the barrier area, and the junior being allowed to pump because his well did not affect the barrier. Although a sufficient water supply may exist, the senior user could be prevented from exercising his valuable water right, depending on the allocation system followed by the state.

In short, ground-water quality cannot be regulated without making decisions that effectively allocate use of the resource, a province traditionally reserved to the states.

The appropriate role of the federal government in ground-water management is to support program development at the state level technically and financially and to utilize state programs when implementing existing federal laws that affect ground water. The General Accounting Office in a recent report attributes the ground-water activity of states in part to the financial assistance received from the Environmental Protection Agency (EPA).[9] Encouraged by EPA's Ground-Water Protection Strategy, many states already have developed protection programs.[10] The strategy does not force state program development but encourages it by providing technical and financial assistance.

States are slowed in their development of protection programs by a lack of understanding of ground-water resources and problems and by budgetary constraints. In many cases, data on ground-water contamination do not exist. Lack of skilled personnel is another serious problem, particularly at the local level. The federal government can do much to alleviate these problems. Various sources of technical information concerning ground water already exist within the federal government. Efforts to coordinate current federal ground-water programs would help identify those geographic areas and categories of data where scientific knowledge is insufficient. Then the agencies with the most expertise can focus on the appropriate research needed to address the problems.

The U.S. Geological Survey (USGS) has the expertise and experience to provide technical assistance in the determination of aquifer yield, quality and vulnerability; the mapping of aquifer boundaries, recharge and discharge areas; and the study of fate and transport of contaminants. The USGS could enhance its role in collecting such information and improve its accessibility to state and local decisionmakers.

EPA has expertise in identifying sources, causes and effects of ground-water contamination. The agency has personnel skilled in the prevention, detection and mitigation of ground-water contamination. They could develop and test technologies and management practices and provide states with technical assistance in the implementation of proven technologies and practices. EPA also could enhance its efforts to determine the health and environmental effects of contaminants and to provide the information necessary to use risk assessment in decisionmaking.

Finally, the federal government could increase its financial assistance to state and local governments striving to implement and enhance ground-water protection programs. Federal grants would help ease the burden on states and localities with relatively small economic bases, thereby contributing to the equitable treatment of all those dependent upon ground water.

While acknowledging the need for federal technical and financial assistance, there are those who also advocate federal regulatory control. They argue: ground-water contamination knows no political boundaries and therefore the federal government must control interstate pollution;[11] that in the absence of federal control many states will do nothing to protect their ground water,[12] and that particular sources of ground-water contamination, including mining, should be controlled through a uniform federal approach.[13] Each of these arguments will be considered in turn.

The argument that new federal control legislation is needed because of the threat of interstate pollution lacks merit. According to EPA studies, 95 percent of ground-water contamination plumes travel less than two miles from their source.[14] Given this short distance, it is unlikely that interstate pollution will be a significant issue. Where it exists, there are mechanisms for addressing the problem short of enacting comprehensive federal legislation. For example, states certainly have the ability to form compacts to protect ground water. The history of surface water protection and cleanup has shown the effectiveness of such compacts.[15] Also, existing federal statutes such as Superfund, the Resource Conservation and Recovery Act, the Surface Mining Control and Reclamation Act and the Safe Drinking Water Act all provide authority to control interstate ground-water pollution and protect sources of drinking water.

Regulatory agencies, it is claimed, have been slow to exercise their statutory authority to protect ground water. Critics contend that state and local agencies do not have adequate expertise or muscle to control contamination of their ground water, particularly by large industries important to local economies.

The implication is that states are not concerned sufficiently about protecting public health and that, without force from the federal government, many states will do nothing to protect the ground water in their jurisdictions. This simply is not the case.

As of February 1988, all 50 states, the District of Columbia and six territories have legislation in effect to protect ground water. With respect to protection plans, which are construed frequently as an indicator of a state's commitment to ground-water protection, 22 of the 57 states and territories have a written plan, 26 of the remaining 35 have plans under development and five are committed to developing plans. Only four states (Michigan, Montana, New Jersey and Texas) reported no intention of developing a protection plan, but all four have either narrative or numerical ground-water standards in place. Eighty percent of the states and territories (46 of 57) have implemented, to a moderate or greater extent, programs to control discharges to ground water.[16]

Such state activity certainly belies the assertion that states are uninterested or lack motivation to protect their ground-water resources. There is every reason to believe that as more information becomes available on contaminants and methods to control them, state and local governments will strengthen their regulatory programs. For the most part, it is a lack of sufficient technical and financial resources, not a lack of interest or desire, that hinders states and localities from improving their ground-water protection programs.[17]

Examples of Two State Programs

It is instructive to look more closely at how two different states on opposite ends of the country, one in New England and the other in the desert Southwest, have developed programs to fit their individual needs and circumstances. This description does not imply a mining industry endorsement of these programs. In fact, the industry cautions against the notion that either plan or any other model necessarily would be appropriate for other states.

Arizona has developed a fairly extensive system to protect its ground-water resources. Being a water-scarce area, the issues of water rights, allocation and quality long have been major areas of concern and debate for local governments and the state. Irrigation historically has been the largest user of Arizona's ground water, with increasing stress being put on the resource as a result of the quick pace of industrial development and population growth.

Arizona's aquifers are generally in highly permeable, unconsolidated material. The largest proportion of contamination cases are attributable to industrial wastes, particularly trichloroethylene (30 percent), followed by landfill leachate (26 percent) and organic wastes (26 percent).[18] In addition, mineral content of the ground water is naturally high, limiting its use in some cases.

The state's awareness of the importance of its ground-water resource prompted it in 1980 to pass the first state comprehensive legislative framework for ground-water management—the Arizona Ground Water Management Act. Since that time, the Arizona Department of Health Services has established action levels for at least 30 chemicals that are of particular concern in the state.

The administering body, the Department of Water Resources, established four areas of particular concern due to continuous overdraft and designed plans specifically to meet the needs of each area. All wells must be registered and metered for determining withdrawal fees, and ground-water discharge permits are required for all otherwise-unregulated activities.

Because of the importance of agriculture in the state, the use of pesticides is strictly controlled by the Structural Pest Control Board, which recently has had its authority expanded.[19] The state and EPA have coordinated their efforts through a 1985 agreement identifying ground-water quality management as a priority environmental issue.

Connecticut is currently much less dependent on its ground-water resources for domestic use than the majority of states. However, the importance of ground water is increasing as population growth puts more stress on surface water resources.

Connecticut's aquifers occur both in unconsolidated material and in bedrock, with the quality of the waters varying considerably. Public water systems and industry are the principal users of ground water in the state. Contamination has come mainly from waste disposal facilities, underground storage tanks, accidental spills, pesticides and road salt.[20]

Connecticut was one of the first states to adopt a comprehensive ground-water management strategy. Its strategy is based on a four-category classification system and extensive data on the state's aquifers. Aquifers are classified according to use, and water quality is managed on a use rather than a discharge basis. The state administering authority, the Connecticut Department of Environmental Protection, works closely with industry and local governments and actively involves the public.

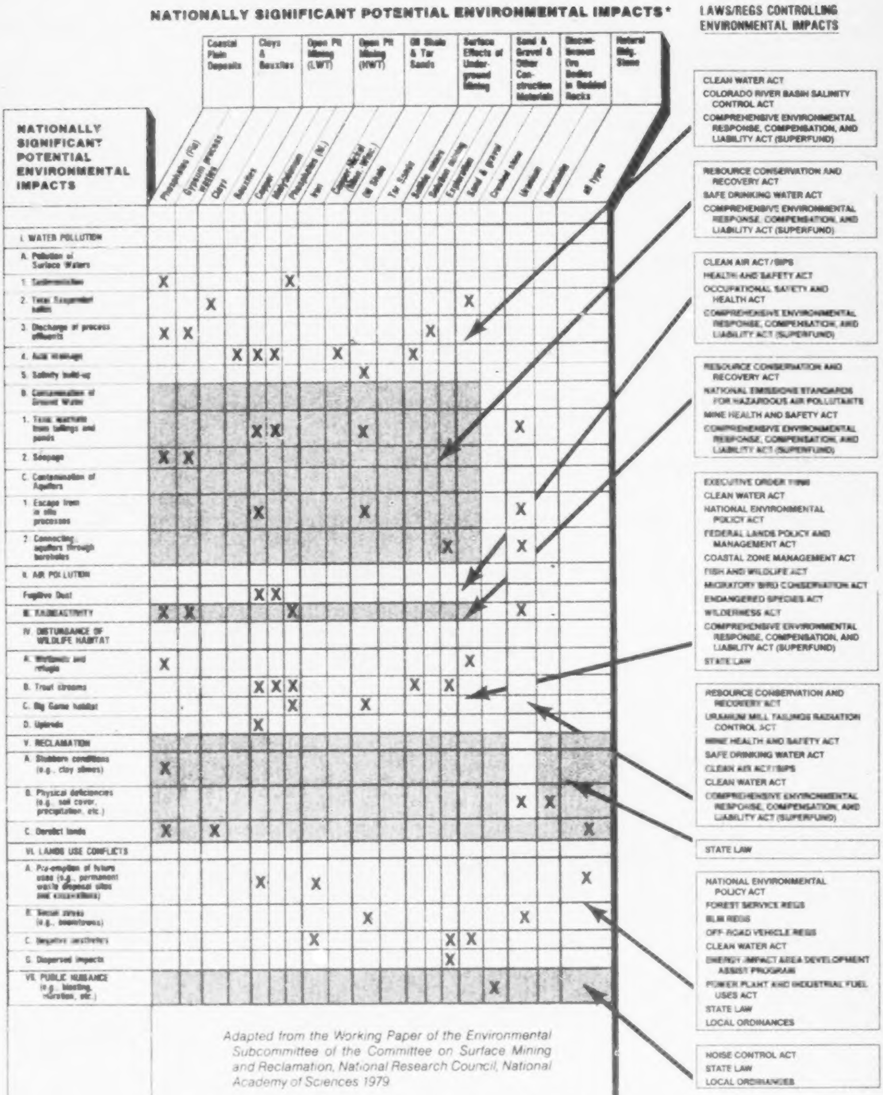
Both the Arizona and Connecticut programs generally are regarded as successful, despite their differences. Of course, some state programs are not as advanced and comprehensive as these two. Continued technical and financial assistance from the federal government, however, should continue to improve the situation.

EXISTING CONTROLS ON MINING

The need to control uniformly specific sources that discharge to ground water also has been given as a reason for federal control legislation. Industrial activities, including mining, are identified as sources requiring such federal regulation.[21] Too quickly dismissed in this argument, however, are the laws and regulations already in place that require ground-water protection.

Numerous federal, state and local programs control the manner in which mining is conducted, including activities with the potential to affect ground water. Existing federal and state statutes that apply to mining and its effect on ground water are described below and summarized graphically in Figure 1.

- The federal Surface Mining Control and Reclamation Act, 130 U.S.C. 1201, and correlative state statutes require all coal mines to comply with stringent environmental control requirements, including the minimization of impacts to the hydrologic balance and the restoration of land use. These statutes also contain provisions for declaring lands unsuitable for mining, replacing private wells and authorizing reclamation of abandoned mine lands.
- The federal Uranium Mill Tailings Radiation Control Act of 1978, 149 U.S.C. 7901, imposes stringent requirements on the disposal of uranium mill tailings to protect ground water. Under this Act, EPA has issued ground-water protection regulations that control radioactive contaminants (such as radium) as well as nonradiological toxic substances (such as arsenic and selenium) found in such tailings in small amounts.
- Numerous mines, particularly in the western states, are located on federal land. For minerals other than coal, federal land managers are authorized under the National Environmental Policy Act (NEPA), 142 U.S.C. 4371, to impose any requirements deemed necessary to "attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences." In conjunction with this authority, the Federal Land Policy and Management Act, 143 U.S.C. 1701, provides for the regulation by the Bureau of Land Management of the use of public lands for mining and other purposes in a manner that will protect environmental and water resource values. Associated mining laws derived from these Acts and administered by the Bureau of Land Management also provide for the protection of water resources by requiring ground-water monitoring and various preventive and corrective activities.
- The federal Solid Waste Disposal Act, 142 U.S.C. 3251, authorizes EPA to regulate the disposal of solid waste, including mining waste, to protect human health and the environment. Numerous states have adopted comprehensive mine reclamation and solid waste statutes that contain specific ground-water protection provisions. EPA has the authority under Subtitle D of the Act to approve state plans for the management of solid waste from mining and other activities. Under this subtitle, EPA is obligated to promulgate criteria that shall consider, among other things, "the reasonable protection of the quality of the ground and surface waters from leachate contamination."
- The federal Comprehensive Environmental Response, Compensation and Liability Act, 142 U.S.C. 9601, provides for control of releases of hazardous substances to the environment from most commercial and industrial activities, including mining. The statutory definition of "environment" specifically includes ground water. Furthermore, ground water is identified as one of the specific pathways to be assessed in evaluating every actual or potential release of hazardous substances.
- The federal Safe Drinking Water Act, 142 U.S.C. 300, and correlative state statutes protect surface and underground sources of public drinking water. Under the Act, national drinking water stan-



NATIONALLY SIGNIFICANT POTENTIAL ENVIRONMENTAL IMPACTS*

NATIONALLY SIGNIFICANT POTENTIAL ENVIRONMENTAL IMPACTS	Coastal Plain Deposits		Clays & Bauxites		Open Pit Mining (LWT)			Open Pit Mining (HWT)		Oil Shale & Tar Sands		Surface Effects of Under-ground Mining			Sand & Gravel & Other Con-struction Materials		Discon-tinuous Ore Bodies in Bedded Rocks		Natural Bldg. Stone
	Phosphates (Fla)	Gypsum process wastes	Clays	Bauxites	Copper	Molybdenum	Phosphates (Id.)	Iron	Copper-Nickel (Minn.-Wisc.)	Oil Shale	Tar Sands	Sulfide zones	Solution mining	Exploration	Sand & gravel	Crushed stone	Uranium	[illegible]	all types
I. WATER POLLUTION																			
A. Pollution of Surface Waters																			
1. Sedimentation	X						X												
2. Total Suspended solids			X												X				
3. Discharge of process effluents	X	X											X						
4. Acid drainage				X	X	X			X			X							
5. Salinity build-up										X									
B. Contamination of Ground Water																			
1. Toxic leachate from tailings and ponds					X	X				X							X		
2. Seepage	X	X																	
C. Contamination of Aquifers																			
1. Escape from in situ processes					X					X							X		
2. Connecting aquifers through boreholes														X			X		
II. AIR POLLUTION																			
Fugitive Dust					X	X													
III. RADIOACTIVITY	X	X					X										X		
IV. DISTURBANCE OF WILDLIFE HABITAT																			
A. Wetlands and refugia	X														X				
B. Trout streams					X	X	X					X		X					
C. Big Game habitat							X			X									
D. Uplands					X														
V. RECLAMATION																			
A. Stubborn conditions (e.g., clay slimes)	X																		
B. Physical deficiencies (e.g., soil cover, precipitation, etc.)																	X	X	
C. Derelict lands	X		X																X
VI. LANDS USE CONFLICTS																			
A. Pre-emption of future uses (e.g., permanent waste disposal sites and excavations)					X			X											X
B. Social stress (e.g., boomtowns)										X							X		
C. Negative aesthetics								X						X	X				
D. Dispersed impacts														X					
VII. PUBLIC NUISANCE (e.g., blasting, vibration, etc.)																X			

Adapted from the Working Paper of the Environmental Subcommittee of the Committee on Surface Mining and Reclamation, National Research Council, National Academy of Sciences 1979.

*This chart was originally developed for a study of minerals other than coal. Coal mining is heavily regulated by the Surface Mining Control and Reclamation Act, which addresses all of the significant environmental impacts of that activity.

LAWS/REGS CONTROLLING ENVIRONMENTAL IMPACTS

CLEAN WATER ACT
COLORADO RIVER BASIN SALINITY CONTROL ACT
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND)

RESOURCE CONSERVATION AND RECOVERY ACT
SAFE DRINKING WATER ACT
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND)

CLEAN AIR ACT/SIPS
HEALTH AND SAFETY ACT
OCCUPATIONAL SAFETY AND HEALTH ACT
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND)

RESOURCE CONSERVATION AND RECOVERY ACT
NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS
MINE HEALTH AND SAFETY ACT
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND)

EXECUTIVE ORDER [illegible]
CLEAN WATER ACT
NATIONAL ENVIRONMENTAL POLICY ACT
FEDERAL LANDS POLICY AND MANAGEMENT ACT
COASTAL ZONE MANAGEMENT ACT
FISH AND WILDLIFE ACT
MIGRATORY BIRD CONSERVATION ACT
ENDANGERED SPECIES ACT
WILDERNESS ACT
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND)
STATE LAW

RESOURCE CONSERVATION AND RECOVERY ACT
URANIUM MILL TAILINGS RADIATION CONTROL ACT
MINE HEALTH AND SAFETY ACT
SAFE DRINKING WATER ACT
CLEAN AIR ACT/SIPS
CLEAN WATER ACT
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (SUPERFUND)

STATE LAW

NATIONAL ENVIRONMENTAL POLICY ACT
FOREST SERVICE REGS
BLM REGS
OFF-ROAD VEHICLE REGS
CLEAN WATER ACT
ENERGY IMPACT AREA DEVELOPMENT ASSIST PROGRAM
POWER PLANT AND INDUSTRIAL FUEL USES ACT
STATE LAW
LOCAL ORDINANCES

NOISE CONTROL ACT
STATE LAW
LOCAL ORDINANCES

dards applicable to public water supply systems have been established for a number of contaminants and a continuing program is underway to set standards for others. The underground injection control program, established under the Act, regulates mining done by fluid injection. Detailed requirements have been established for Class III wells, which include Frasch sulfur, uranium and copper solution mining operations. EPA is developing a program for regulating Class V wells, which include sand backfilling, oil shale production and geothermal wells. The Act's sole-source aquifer program protects aquifers that are the sole source of a community's drinking water supply. The wellhead protection program is designed to protect the area immediately surrounding public drinking water wells.

- The federal Clean Water Act, 133 U.S.C. 1251-1378, and correlative state statutes control discharges to surface waters, which often interconnect with ground water. Under the Act, mining operations are prohibited from discharging contaminants in excess of specific limits contained in individual water discharge permits.
- Under local zoning laws, mining rarely can be conducted without a special use permit. Local government bodies issue such permits, which usually contain conditions designed to address ground-water concerns. In addition, because mining cannot occur without obtaining approval from at least one federal agency, NEPA's Environmental Impact Statement process allows local governments and other interested parties to provide input on ground-water concerns to federal decisionmakers.

According to a February 1987 report,[22] EPA has at least 270 programs addressing 25 of the 33 sources of ground-water contamination listed by the Office of Technology Assessment.[23] Mining is one of the 25 sources covered by these existing programs.

The foregoing list should make it clear that mining operations, along with many other industrial activities, are already subject to ground-water protection regulations. Authority for control of ground-water quality exists, in one form or another, at virtually all levels of government, and mining permits are not issued without provisions for minimizing or avoiding ground-water contamination.

CONCLUSIONS

Because of its many important uses, ground water must be managed in a balanced fashion. One resource cannot be protected to the exclusion of others.

To a very large extent, this balancing already occurs through the interplay of state and federal environmental, mining and water laws. The resultant mix is complex, but necessary to accommodate state and regional needs and differences.

It would be a mistake to react to critics of the current system by adopting yet another layer of uniform federal regulations. Ground-water quality cannot be regulated without affecting ground-water allocation. Therefore, the states, which have longstanding primacy over water allocation, must continue to have primary authority for ground-water protection. To the extent that problems exist, the federal government can use its technical expertise and data-gathering capabilities to provide information to help the states solve their ground-water problems on a site-specific basis.

Numerous ground-water protection and source-control programs already exist at federal, state and local levels. Therefore, no new comprehensive federal legislation is needed to protect ground-water resources. Rather, efforts should be made to enforce existing laws and help states and municipalities in their efforts to maintain and refine their ground-water protection programs.

FOOTNOTES

1. Senator David Durenberger (R-MN), Statement on introduction of S.2091, "Ground Water Protection Act." 134 CONG. REC. S1438-S1445 (daily ed. February 23, 1988); Testimony by Velma M. Smith, Director, Ground Water Protection Project, Environmental Policy Institute, before the U.S. Senate Energy and Natural Resources Committee, Water and Power Subcommittee (June 18, 1987).
2. See, "Mining & Ground Water," American Mining Congress (first paper in this series).
3. Ibid.
4. Ibid., see also, "Ground-Water Management: Nondegradation versus Management for Multiple Use," American Mining Congress (third paper in this series).
5. Also known as the "Rule of Capture" doctrine. The landowner or person "capturing" the ground water may extract it for any purpose without limitation and may use it on or off the overlying land. *See e.g.,* Tex. Water Code Ann., Tit. 4, §52.002.
6. Also known as the "American Rule." A modification of the Absolute Dominion Rule, which limits ground water use to reasonable uses on the overlying land. *See e.g., City of Pasadena v. City of Alhambra,* 33 Cal. 2d 908, 207 P.2d (1949).
7. Under this doctrine the landowner holds essentially proprietary shares in the underlying aquifer in proportion to his ownership of the overlying land. In times of water shortage, water is allocated on a pro rata basis to overlying landowners. *See e.g., Bristor v. Cheatham,* 75 Ariz. 227, 255 P.2d 173 (1953); *In re Metropolitan Utilities District of Omaha,* 179 Neb. 783, 140 N.W.2d 626 (1966); and *Beth v. Hoisveen,* 157 N.W.2d 728 (N.D. 1968).
8. Under this doctrine, ground-water use is allocated in order of priority; that is, the most recently acquired water rights are curtailed in favor of senior water rights whenever shortages occur. See e.g., Alaska Stat. §46.15.040; Kan. Stat. Ann. §82a-701, *et seq.* (1963); Nev. Rev. Stat. §534.010, N. Mex. Stat. Ann. §72-12-1 (1978); N. Dak. Cent. Code §61-04-01.2; Okla. Stat. Ann., Tit. 82, §102.01, *et seq.*; Ore. Rev. Stat. §537.505; S. Dak. Comp. Laws §46-6-1, *et seq.* (1967); Utah Code Ann. §73-1-1, *et seq.* (1953); Wash. Rev. Code Ann. §904.14; and Wyo. Stat. Ann. §41-3-901, *et seq.* (1977).
9. Groundwater Quality, State Activities to Guard Against Contaminants, United States General Accounting Office, February 1988, p. 31.
10. Survey of State Ground-Water Quality Protection Legislation 1985, United States EPA, March 1987; Overview of State Ground-Water Program Summaries, Volume I, United States EPA, March 1985.
11. Testimony by David K. Baker, Political Director, Friends of the Earth, before the U.S. Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power (June 18, 1987).
12. Testimony by Erik D. Olson, Counsel, Pollution and Toxic Substances Division, National Wildlife Federation, before the U.S. Senate Committee on Energy and Natural Resources, Subcommittee on Water and Power (June 18, 1987).
13. See Id. at Note 1 above.
14. Guidelines for Ground-Water Classification Under the EPA Ground-Water Protection Strategy, Final Draft, December 1986, p. E-36.
15. A prime example of a successful interstate compact is the Delaware River Basin Commission. Formed in 1961 to address pollution problems in the Delaware River Basin, it is a regional solution for regional problems. Delaware, New Jersey, New York and Pennsylvania are the state members. The federal government is represented by the U.S. Department of the Interior.
16. Id. at Note 9 above, pp. 26-28.
17. Current Water-Related Programs of the U.S. Geological Survey and the Environmental Protection Agency with Emphasis on Groundwater. Hearings before the Subcommittee on Water and Power of the Senate Committee on Energy and Natural Resources, S. Hrg. Doc. No. 100-330, 100th Cong., 1st Sess. 141 (1987) (Statement by D. Craig Bell, Executive Director, Western States Water Council).
18. ye, Patrick, Quarles, Ground-Water Contamination in the U.S., University of Pennsylvania Press, 1983.
19. Survey of State Ground-Water Quality Protection Legislation 1985, United States EPA, March 1987, p. 31.
20. Ground Water Quality Protection:State and Local Strategies, National Academy Press, 1986, p. 46.
21. S. 2091, 100th Cong., 2d Sess., Sections 301, 306 (1988).
22. EPA Activities Related to Sources of Ground-Water Contamination, United States EPA, February 1987.
23. Protecting the Nation's Ground Water from Contamination, U.S. Congress, Office of Technology Assessment, October 1984.

ENVIRONMENTAL ISSUES
INSIGHTS

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Ground-Water Management:

Nondegradation Versus Management for Multiple Use

Proper management of ground water has become an important societal goal. Sharing this goal, the American mining industry takes seriously its responsibility to protect the Nation's ground-water resource and those who use it. This paper is the third in a series on the relationships between mining and ground water and other issues related to the development of a reasonable ground-water management strategy.

Ground water is a valuable resource necessary for a wide range of human activity. In the United States, about 50 percent of the population depends upon ground water for drinking water supplies. Irrigation is the largest single use of ground water. Ground water accounts for about 40 percent of all water used in irrigating cropland. In addition, ground water has many other important commercial and industrial uses, including mining and mineral processing.

Ground-Water Uses by Volume in 1980

Activity	Volume Used*
Irrigation	60 bgd
Industrial Uses	12 bgd
Drinking Water (public supply)	12 bgd
Rural Household	4 bgd
Rural Stock	1 bgd
Total	89 bgd

billions of gallons per day

Ground water is affected in quality and quantity not only by those activities that consume or come into direct contact with it, but also by many other common and essential human activities that affect it in an indirect manner. Those activities having a passive, indirect effect include the use of fertilizers, septic tanks, and highway deicing compounds; construction; mining; and forestry.

Given the importance of ground water and its many uses, both active and passive, this resource must be carefully managed. This paper explores the subject of how ground water should be managed, exposing the fallacies and defects of a "nondegradation" approach and supporting management for multiple, beneficial uses of the resource.

Degradation is the reduction or deterioration of ground-water quality. Nondegradation implies no loss of existing quality in ground water from contamination, whether from natural or man-made sources.

While at least 16 states have, in theory, adopted nondegradation as their standard for ground-water quality,[1] nowhere has it been successfully implemented and enforced.[2] The reason is simple: while nondegradation is laudable in theory, it is inherently unworkable in practice.

In its literal sense, nondegradation means that not even one molecule of a contaminant can be introduced into the ground water. This is the equivalent of a "zero discharge" or "zero migration" standard. If strictly implemented, human activity would cease under such a standard because most common and essential activities of man affect ground water to one degree or another. The very ordinary economic processes of growth and development—the construction of new housing and industrial facilities, for example—can affect ground-water quality. It is virtually impossible to continue such beneficial uses of ground water as human consumption, agriculture, livestock watering, and mining without affecting the ground-water resource in some way. Yet, this is exactly what a nondegradation standard requires.

Even nature does not adhere to such a standard. Natural contamination of ground water, in the absence of human activity, can result from the normal leaching of minerals in the host rock, the intrusion of salt water or brackish water, the interaction with surface water containing hydrocarbons, inorganic chemicals and biological matter, and through other normal hydrogeologic processes.

To apply a nondegradation standard to all ground water as a blanket federal or state policy would be overly simplistic. It is not logical to protect the existing quality of ground water that is naturally saline or that contains high concentrations of total dissolved solids when it could be put to some beneficial use. The exact amount of such water is difficult to estimate with accuracy, but in some areas of the country it can be a significant percentage of the ground-water resource.

Nondegradation may seem to make more sense for carefully delineated portions of aquifers having high quality water suitable for drinking water. Even in such situations, however, implementation and enforcement of the standard would be difficult. Baseline data would have to be developed such that it would be possible to distinguish changes in quality due to natural forces from those attributable to human activity. A question also would arise as to the workable meaning of nondegradation. Is it to be a literal zero discharge standard, or will some change in quality be permitted? For example, should miniscule or otherwise de minimis amounts of degradation be allowed if they have no effect on health or the environment?

Because of its practical difficulties, proponents of nondegradation choose to view it as a symbolic goal. Even they admit that some degradation must be allowed.[3] But even as a goal nondegradation can be detrimental. In fact, forcing managers and planners to operate under a nondegradation standard can be wasteful and destructive by diverting attention away from implementing protective measures that are actually commensurate with the public health or environmental risks involved.

Failure to consider all relevant factors, including comparative risks, in decisionmaking can result in costly misallocation of resources. Thus a nondegradation policy is not only impractical, but counter-productive. As EPA Administrator, Lee Thomas, said in February 1987 at a Senior Executive Service Forum: "We cannot accept a zero-risk approach, no matter how much idealists crave one. We are not living in a risk-free society, and there are technical and economic reasons why risk cannot be reduced beyond a certain point."[4]

A reasonable and efficient approach to ground-water management is to consider both the degree and extent of contamination and the risks of exposure on a case-by-case basis. Where ground water is contaminated, either by natural or manmade sources, it only poses a risk to the public health or to the environment when it comes into contact with biological receptors (people, animals or plants). These risk factors can be combined with economic, technical and scientific information to improve the efficiency of decisionmaking.

MANAGEMENT FOR MULTIPLE BENEFICIAL USES

It is not only possible and practical, but also necessary, to manage ground water for the many beneficial ways in which it is used. Of course, careful management is required to insure that the uses allowed are consistent with other existing and possible future uses of the resource.

The same aquifer can be used for many purposes simultaneously, depending on local geology, water quality, and other site-specific considerations. For example, mining, drinking water wells, irrigation and stock watering could all occur in different locations within the same aquifer so long as care is taken to manage the ground water consistent with such varied uses. Ground water used for one purpose may also be used subsequently for other purposes. For example, ground water from a reclaimed mining area may be used for crop irrigation or stock watering.

Management for multiple uses requires a knowledge of the ground-water resource in a particular location, the geology, topography, climate, and recharge potential of the aquifer, as well as an understanding of the need for the various activities and uses demanded of the ground water. Included in this latter category are questions of population, employment needs, location of other valuable natural resources such as minerals and forests, all existing industrial and commercial operations, indeed the economic base of the surrounding communities. Ground-water managers must also bear in mind that their decisions concerning ground water are inherently land use decisions. As such, they must be coordinated with local land use strategies.

Because of the many site-specific factors that must be considered and the knowledge of local conditions that is necessary, states and local governments have taken the lead on ground-water management for multiple beneficial uses. No comprehensive, uniform standard or program initiated by the federal government could adequately supplant the need for such local decisionmaking. The longstanding federal deference to state and local governments respecting land use planning and water allocation is rational and must continue to apply to ground-water protection and management.

Management practices and source controls already exist for activities, including mining, that limit effects to and allow for other beneficial uses of the ground-water resource. Another AMC paper in this series discusses these controls on mining operations.

This is not to say that ground-water management guidelines are not necessary. However, any management or standard-setting program must allow for multiple beneficial uses. A nondegradation objective is clearly inappropriate, especially when the ground water is not suitable for human consumption. Where ground water is already significantly contaminated with natural or manmade pollutants and is not likely to be needed for any other beneficial uses, its dedication to active or passive industrial operations—including mineral and energy recovery—must not be impeded by rigid requirements to preserve its quality.

A flexible management program for ground water would allow for many different current and future beneficial uses. Balance has to be reached on a site-by-site basis between the need for the ground water and the likelihood of exposure to biological receptors on the one hand, and the need for the activity or facility that may affect it on the other hand.

Balancing the uses of ground water can be a valuable management tool for setting ground-water protection priorities and allocating limited resources for protecting ground water efficiently. A flexible management program also allows ground-water protection decisions to be made in conjunction with land use decisions, so that a sensible choice can be struck between the need to protect ground-water quality and the need to allow normal human economic activity to proceed.

Finally, a policy based on management for multiple beneficial uses can protect people and other living things in the biosphere from the risks of contaminated ground water as well as, or even better than, a policy of nondegradation. Since exposure to ground water is often controllable, and thus exposure to the risk is controllable, a balanced policy permits decisionmakers to concentrate the available protection resources where they are most needed to reduce risk. In contrast, a policy based on nondegradation would require that resources be spread thin in the attempt to avoid any loss of ground-water quality anywhere, even where the exposure risks are negligible. A balanced approach based on mangagement for multiple beneficial uses thus emerges as the most effective and efficient approach to the problem of protecting our ground-water resources for ourselves and future generations.

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[1] *Overview of State Ground-Water Program Summaries*, Volume I, U.S. Environmental Protection Agency, Office of Water, March 1985.

[2] Pye, Patrick, Quarles, *Ground-Water Contamination in the U.S.*, University of Pennsylvania Press, 1983.

[3] Remarks of Senator David Durenburger (R-MN), *Ground-Water Protection: Legislative Outlook*, Environmental, Energy & Study Institute, Washington, D.C., May 14, 1987.

[4] "Thomas Talks About His Goals for EPA," *EPA Journal*, June 1987, Volume 13, Number 5, page 28.

STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION BEFORE THE SUBCOMMITTEE ON GOVERNMENT EFFICIENCY, FEDERALISM, AND THE DISTRICT OF COLUMBIA OF THE SENATE COMMITTEE ON GOVERNMENTAL AFFAIRS WITH REGARD TO GROUNDWATER PROTECTION

Presented by Mark A. Maslyn
Assistant Director, National Affairs Division

May 18, 1988

On behalf of the Farm Bureau, I want to thank you for the opportunity to appear before you today to speak on the issue of groundwater protection and S. 1992 in particular.

The Farm Bureau is the nation's largest general farm organization with over 3.5 million member families in 49 states and Puerto Rico. Farm Bureau members produce nearly every agricultural commodity grown or raised in commercial quantities in the United States.

Groundwater protection poses some very unique and serious problems for farmers and ranchers. We are faced with a dilemma between the need to ensure that millions of private wells in our rural areas remain a safe source of drinking water, and a recognition that it may be irrelevant if the means to achieve that end make farming and ranching an unprofitable or impractical venture.

The issue of groundwater is not new to the Farm Bureau. In fact, we have had member derived policy for more than ten years. In addition, we have taken many steps to inform and educate our member families about the issue through numerous articles and publications, as well as hundreds of conferences, meetings and workshops. For example, last year we published an environmental checklist to be used on the farm to identify potential environmental risks. I know that the Tennessee and Pennsylvania Farm Bureaus have distributed this checklist widely and have incorporated it in their County Farm Bureau programs.

In addition to the environmental checklist, we have helped thousands of Farm Bureau members test their own wells for possible contaminants. We are actively encouraging every County Farm Bureau to adopt and promote this well testing program.

Additional examples of some other activities include the following:

* Seven County Farm Bureaus in Indiana offered nitrate testing of water well samples at their county fairs in the summer of 1987. Indiana Farm Bureau also participated with the Purdue Agronomy Department in a sampling program at the Agronomy Farm Field Day. None of the samples tested exceeded nitrate health standards.

* Pennsylvania Farmers Association (Farm Bureau) tested nitrates for several thousand farmers at the statewide Ag Progress Days, as part of an on-going county Farm Bureau program.

* North Dakota Farm Bureau is working with their state Health Department to test well water for nitrates at NDFB's statewide annual meeting.

* Massachusetts, Maryland, Minnesota and New Hampshire Farm Bureaus are planning to use Farm Bureau's Groundwater and Environmental Pollution Self-Help Checklist at their annual meeting workshops.

* Ohio Farm Bureau has been part of a cooperative nitrate testing program with Heidelberg College and other groups. As of October 22, 1987, 25 counties participated and 5,000 wells were tested. Ninety-seven (97) percent of the samples were less than 10 ppm. Eighty (80) percent showed no contamination at all.

In addition, the Ohio Farm Bureau, Soil and Water Conservation Service, Extension and EPA are working jointly to promote a conservation tillage program with Ohio farmers. The group is interested in developing economic incentives to encourage farmers to adopt conservation tillage practices.

* In February, 1986, the American Farm Bureau Federation conducted an educational water testing program at its annual Program Kickoff Meeting. Samples were received and analyzed from 44 states.

* Oregon Farm Bureau helped initiate a voluntary disposal program for empty pesticide containers in conjunction with the Oregon Agricultural Chemicals Association. The pilot program in 1984 involved one site and collected 8,000 containers. In 1986, the program involved 15 sites and collected 20,000 cans.

* Massachusetts Farm Bureau has been instrumental in getting several departments of the state government to work together on, and the state legislature to fund, a demonstration program for composting manure. This stabilizes nutrients and reduces odor.

* New York, Connecticut and Massachusetts Farm Bureaus have been active in seeking state support of IPM studies.

* AFBF initiated its own Conservation Tillage Action Plan in 1983. It is designed to encourage state and county Farm Bureaus to take a more active role in promoting conservation tillage. County Farm Bureaus in South Carolina, Tennessee and Indiana contributed funds or time to set up demonstration and equipment rental programs where none had existed.

* Over 1,000 copies of AFBF's booklet "Farm Partners, Have You Hugged Your Soil Lately?" have been distributed. Also, over 40 sets of a slide show illustrating the program have been distributed. The material takes a systems approach to soil compaction, erosion and protective soil cover. The workshop includes actual field experience and stresses cooperation with local extension and soil and water experts.

* North Carolina, South Carolina and Virginia Farm Bureaus have initiated and helped pass state laws allowing tax credits for farmers who purchase conservation tillage equipment.

For your review I have provided a copy of the program manual to your staff, and have attached copies of two publications we have developed for our members to my complete statement.

Mr. Chairman, we want to commend you and Senator Heinz and Senator Roth for sponsoring this legislation known as S. 1992. Establishing a mechanism to promote intergovernmental and interagency communication and cooperation is an essential first-step in attempting to address an issue as complex and diverse as groundwater efficiently and effectively.

Perhaps even more important from our point of view is that it recognizes that state and local governments have a major role in the protection of groundwater. Farm Bureau believes that the site specific and soil specific nature of the problem requires a strong primary role for state governments.

From our point of view, federal groundwater legislation must be premised with the goal of preserving family farming as a viable entity. Accordingly, it must understand the vital role that agricultural chemicals play in modern farming, and it must be responsive to the concerns of private property owners.

Related to that, I have one overall recommendation concerning the legislation before us today, and that is to give higher profile to the Department of Agriculture. While it probably comes as no surprise to have the Farm Bureau feel that way, there is good reason behind it. We have long believed that any federal groundwater legislation should recognize USDA as a full and equal partner with substantive and defined responsibilities.

The Soil Conservation Service (SCS), the Agricultural Stabilization and Conservation Service (ASCS), the Agricultural Research Service (ARS), the Cooperative State Research Service (CSRS) and the Extension Service all have outstanding technical, scientific, data collection and outreach capability in the soil and water area that should be utilized. In short they have the expertise and the site specific/soil specific knowledge necessary to make sound decisions. Because of this capability, I would urge you to consider making the Secretary of Agriculture a co-chair of the Interagency Committee.

Beyond the previous suggestion, I have a number of specific questions about S. 1992 that I would draw to your attention:

Section 2(b)(2) outlines the duties of the Interagency Committee. While authorized to "identify and eliminate duplications and overlap between or among programs of member agencies", it isn't clear how that would be accomplished. Who defers, and how would conflict be resolved, particularly when popular programs are involved?

Continuing in this section, subparagraph (D) speaks to the development of "overall priorities and a coordinated plan for addressing State technical assistance, information and research needs...". I would again remind you of the role that USDA related agencies could play because of their hands-on expertise and familiarity with local needs.

I would also urge the same consideration in efforts to carry out duties mentioned in subparagraph (E).

Section 2(c) addresses the role of the Advisory Committee. The section allows for the appointment of "not more than 11 individuals representing state and local governments". Once again, I believe it would be productive to expand the committee if necessary to include representatives of AFSC, SCS Extension Service, Land Grant Universities and the State Geologist. These are the people working with the programs in the field who could provide valuable insight.

One further suggestion would be to have the Advisory Committee conduct meetings with affected interests, such as the farm community, to seek input on research and information needs, and other improvements to the program.

In conclusion, we support the intent of your legislation. It is an essential first step in dealing with an issue like groundwater, with so many jurisdictional claims, that we begin to coordinate the many federal and state activities. We have also sought to establish the notion that the farm and ranch community, absent a clear and consistent federal groundwater policy, has initiated training, testing, educational and information programs on its own.

We look forward to working with you on this legislation and are anxious to assist you in any way we can. We appreciate your consideration of our views.

Attachments

Farm Bureau's
Groundwater & Environmental Pollution

Self-Help Checklist

for Farmsteads and Farm Fields

Purpose: This thought-provoking checklist will help you analyze your own water supply and farming operations.

- ✓ Fill out this Checklist
- ✓ Review it once a year, and
- ✓ Act voluntarily to reduce or prevent pollution from your farming activities.

**IS
YOUR
DRINKING
WATER
SAFE?**

I. BASIC INFO ON YOUR WATER SUPPLY & TESTING, CLIMATE AND SOILS:

Which system provides drinking water for your family and/or livestock?

____ **PUBLIC** (EPA defines it as any system with 15 or more connections or serving 25 or more people, including most rural water districts.) Water testing and treatment required by federal Safe Drinking Water Act.

____ **PRIVATE** (includes your own system; bottled water; and systems with 14 or fewer connections or systems serving 24 or less people). Water tests generally not required except for dairies and for new wells.

Check ✓ the source/s from which your system draws its water:

GROUNDWATER

____ Shallow well, 0 to 50 ft.
____ Medium well, 50 to 150 ft.
____ Well deeper than 150 ft.
____ Artesian well
____ Spring

SURFACE WATER

____ Stream
____ River
____ Farm pond
____ Lake
____ Cistern

____ Don't know, but I intend to find out.

Is your water treated to kill bacteria? ____ Yes ____ No

If you have a well, is it dug, drilled, or sandpoint? ____________

In what year was your well constructed? ____________

Is your well properly grouted to prevent contamination from rainfall and animal contamination from seeping down along the well's casing? ____ Yes ____ No ____ Don't Know

Does your well's casing extend above ground level? (It should.)
____ Yes ____ No

WATER TESTING

Have you had your water tested within the last year?
____Yes ____ No
If No, what year did you last test it? ____________

Did the test include any of the following? Check those that apply.

____ pH	Done by many state health labs for a small fee. Should be done annually even if no obvious problems exist.
____ Nitrate	
____ Total Coliform Bacteria	
____ Total Dissolved Solids	

____ Pesticide Scan
____ Heavy Metals (lead, arsenic, etc.)
____ Purgable Organic Carbons (fuels, dry cleaning solvents, etc.)

CLIMATE and SOILS

What is the average rainfall for your area? ______ inches.
(Leaching potential increases as annual rainfall increases.)

Is the bedrock limestone? (Karst Topography) ____ Yes ____ No

Are your topsoils shallow to bedrock (less than 3 ft.)
____ Yes ____ No
(Thicker top soils may still be a problem depending on soil type.)

Are your soils generally:
____ Sandy (most likely to allow leaching into groundwater)
____ Loams (medium leaching potential)
____ Clays (least likely to allow leaching)
____ High organic matter (peat or muck)
____ Loam or some combination of those listed above?

How are any ponds or impoundments on your farm recharged?
____ rainfall/runoff
____ groundwater/spring
____ stream
____ pumped well

II. CHECK YOUR FARM'S POTENTIAL TO POLLUTE GROUNDWATER AND YOUR DRINKING WATER SUPPLY

DO YOU: **YES* NO**

- Have limestone bedrock fairly close to the surface? . ____ ____
  (Cracks and sinkholes provide fast movement of runoff and pollutants to groundwater and wells many miles away.)

- Have sandy soils? . . . . ____ ____
  (Fertilizers and chemicals can move rapidly to groundwater.)

- Have water tables within 30 ft. of the surface? . . . . ____ ____

- Have a dug or sandpoint well less than 50 ft. deep? . . ____ ____
  (These are generally old, not properly cased or grouted. Easily contaminated by bacteria, rodents and surface runoff.)

- Have a well pit, uncapped well or abandoned well? . . ____ ____
  (Easily contaminated by surface runoff, flooding and rodents.)

- Have an older submersible well pump? . . . . ____ ____
  (Many older pumps contain lubricating oil with highly toxic PCBs which could contaminate your water supply system.)

- Have lead water pipes or lead-soldered pipe joints? . ____ ____
  (Lead is highly poisonous and could leach into drinking water, especially if the water is acidic.)

- Use your well for both livestock & household use? . . ____ ____
  (Potential for cross contamination exists.)

- Have livestock/poultry within 200 ft. of a well? . . . . ____ ____
  (Bacteria, nitrates and disease may reach the well water.)

- Have a feedlot, manure lagoon or holding facility? . . ____ ____

- Have a septic tank/field within 75 ft. of a well (double the distance in sandy soil)? . . . . ____ ____
  (Bacteria and nitrate contamination is possible.)

- Have a surface water drainage well? . . . . ____ ____
  (Runoff moves chemicals & manure directly into groundwater.)

- Have a farm dump? . . . . ____ ____
  (Improperly disposed house & farm chemicals and animals.)

Page 4

DO YOU: **YES* NO**

- Have an underground fuel tank? . . . . ____ ____
  (Average life of steel tanks is 40 years or less.)
- Put chemicals or fertilizers into your irrigation system? . . . . ____ ____
  (Without proper checkvalves and equipment the potential for backflows into the well exists if the system malfunctions.)
- Use chemicals from EPA's Priority Leachers List (see list below)? . . . . ____ ____
  (If you do use them, try to find a substitute chemical which is equally effective but less likely to leach to groundwater.)
- Apply sewage sludge? . . . . ____ ____
  (Possible problems with heavy metal buildup, disease and nitrates if not monitored carefully.)
- Dump or spread used oil to control road dust? . . . . . ____ ____
  (EPA considers this hazardous waste, better recycle it.)

IF YOU CHECKED "YES" FOR ONE OR MORE OF THE QUESTIONS ON PAGE 3 AND 4 YOU SHOULD DEFINITELY BEGIN A PROGRAM OF ANNUAL WELL WATER TESTING!

*Also, if you checked the "YES" column you should try to reduce your system's pollution potential and/or reduce your production costs.

EPA PRIORITY LEACHERS *(Current as of October 21, 1987 but could change)*

acifluorfen
alachlor
aldicarb
aldicarb sulfone
aldicarb sulfoxide
ametryn
atrazine
atrazine, dealkylated
baygon
bromacil
butylate
carbaryl
carbofuran
carbofuran-3OH
carboxin
carboxin sulfoxide
chloramben
alpha-chlordane
gamma-chlordane
chlorothalonil
cyanazine
cycloate
2,4-D
dalapon
dibromochloropropane
DCPA
DCPA acid metabolites
diazinon
dicamba
5-hydroxy dicamba
3,5-dichlorobenzoic acid
1,2 dichloropropane
dieldrin
diphenamid
dinoseb
disulfoton
disulfoton sulfone
diuron
endrin
ethylene dibromide
ETU
fenamiphos sulfone
fenamiphos sulfoxide
fluormeturon
heptachlor
heptachlor epoxide
hexachlorobenzene
hexazinone
methomyl
methoxychlor
methyl paraoxon
metolachlor
metribuzin
metribuzin DA
metribuzin DADK
metribuzin DK
nitrates
oxamyl
pentachlorophenol
pichloram
pronamide metabolite, RH 24,580
propachlor
propazine
propham
simazine
2,4,5-T
2,4,5-TP
tebuthiuron
terbacil
trifluralin

III. OFF-SITE ASSESSMENT

(i.e., are other people's actions affecting your water supply?)

What is the approximate distance to the nearest neighbor's well? (Express in feet or miles) ______________.

Is that well: ___ shallow (less than 50 feet); ____ deeper than 50 ft.?

From a map or by observation, in what direction does the groundwater flow through your property? From the ______________

________________ to the ______________. (Check with local Soil Conservation Service or State Geological Survey if you don't know the answer.) Often times groundwater moves toward the nearest creek or river.

Place a check mark ✓ next to all **POLLUTANT SOURCES** within a 1-mile radius of your property where the groundwater seems to be coming from. (If your farm's water supply is surface water you may have to think in terms of many miles upstream.)

Pollutant Source	**Potential Pollution or Problem**	**If You Suspect/ observe these Problems, Request These Tests**
____ Ag Areas	All problems listed in Part II	TC, NO_3, pH, TDS, Pesticide Scan.
____ Wetlands	Polluted recharge water.	Bacteria, NO_3.
____ Forests	Pesticide use.	Pesticide scan.
____ Highways	Road salt, lead petroleum.	TDS, chlorides, sodium.
____ Housing	Septic, house and lawn chemicals.	NO_3, surfactants, Fecal Coliform & Streptococcus.
____ Fuel Tank	Gasoline, diesel.	Hydrocarbon scan.
____ City	Street runoff, fuels.	TDS, pH, Hydrocarbon scan.

(Continued)

Pollutant Source	**Potential Pollution or Problem**	**If You Suspect/ observe these Problems, Request These Tests**
____ Industry	Metals, fuels, solvents, acids.	TDS, pH, Hydrocarbon scan.
____ Food Ind.	Rinse water, cleaning solvents.	Bacteria, TDS, pH, Surfactants.
____ Injection Well	Brine, chemicals, & acids.	TDS, pH, acidity, Hydrocarbon Scan, Corrosion Index.
____ Mining	Acid, salts, minerals.	TDS, Fe, SO$_4$, pH, Mn, Al, acidity Corrosion Index.
____ Oil & Gas	Brine, sulfur & minerals	TDS, Na, Cl, Ba, Pb, pH, Strontium, Corrosion Index.
____ Golf Club	Pesticide and Fertilizer use.	NO$_3$, pH, Pesticide Scan.
____ Landfills	Chemicals of all sorts.	TDS, pH, COD, Volatile organics.
____ Sludge	Heavy metals, bacteria.	Bacteria, nitrate, metals.
____ Utilities	Seepage from storage ponds.	TDS, pH
____ Other		

TDS = Total Dissolved Solids, TC = Total Coliform Bacteria, NO$_3$ = Nitrates, Al = Aluminum, Fe = Iron, Cl = Chlorides, Mn = Manganese, Ba = Barium, SO$_4$ = Sulfates, COD = Chemical Oxygen Demand, Pb = Lead, Na = Sodium.

If there is any question in your mind about how any of the pollutant sources you checked above may be affecting your water supply then you should have your water tested. This gives you a baseline against which to compare water test results in future years.

Work closely with local government to deal with off-farm problems.

IV. FERTILIZER CHECKLIST

DO YOU:	Yes	No	Can Improve* Investigate	Does Not Apply
• Soil test every year, including 2 to 3 feet deep? *(Deep testing is important in drier climates to determine how much of last year's nitrogen fertilizer remains within the plant's reach.)*				
• Have a nutrient "BUDGET" for your cropland?				
• Split nitrogen applications by plant growth stages?				
• Give fertilizer credits to manure or sewage sludge?				
• Give nitrogen credits for previous crops such as alfalfa, soybeans, clover, vetch and other legumes?				
• Band fertilizers where possible? *(Banding reduces the amount of rainfall that contacts the fertilizer as the rainfall percolates down through the soil. Banding also reduces the chances of weeds using the fertilizer before your crop does.)*				
• Use goggles and rubber gloves around anhydrous ammonia?				
• Reduce use of nitrogen fertilizers in the fall? *(Spring use increases yield and reduces NO_3 leaching.)*				
• Use N-inhibitors, such as N-Serve?				
• Set "Realistic" yield goals? *(10 percent higher than the average yield for the last 3 years is reasonable.)*				

**Even if you checked the YES or the NO column you also should check the "Can Improve" if you think there's the slightest chance you could reduce your system's pollution potential and/or your production costs.*

V. STORAGE OF AG CHEMICALS

DO YOU:	Yes	No	Can Improve* Investigate	Does Not Apply
• Know whether your fire department would let a building burn if it contained ag chemicals, rather than risk having their water carry chemicals to groundwater or nearby streams?	___	___	___	___
• Padlock chemical storage areas? . .	___	___	___	___
• Keep duplicate records of amounts and types of chemicals in storage and keep one set someplace else other then your chemical storage building? . . . . . . *(The extra record is useful in case of fire.)*	___	___	___	___
• Know which chemicals must be stored in a heated area to prevent loss of effectiveness due to freezing?	___	___	___	___
• Have any chemical containers with missing or unreadable labels?	___	___	___	___

VI. HANDLING & APPLICATION OF AG CHEMICALS

DO YOU:				
• Know that different parts of your body absorb pesticides at different rates?	___	___	___	___

Anatomy	% Parathion Absorption
scalp	32.1
ear canal	46.5
forehead	36.3
forearm	8.6
palm	11.8
abdomen	18.4
scrotum	100.0
ball of foot	13.5

(Researchers in California measured the percent absorption of parathion by different parts of the anatomy:) Most other pesticides have not been checked for body absorption rate.

DO YOU:	**Yes**	**No**	**Can Improve* Investigate**	**Does Not Apply**
• Know that symptoms of low-level organophosphate insecticide poisoning closely mimic the symptoms of exhaustion or flu? . . . . *(Symptons include headaches, loss of appetite, nausea, dizziness, weakness and sweating.)*				
• Know that a product with higher water solubility, longer persistence, and low soil absorption has a greater potential of reaching groundwater?				
• Use integrated Pest Management (IPM) to determine whether the $ loss to the pest is great enough to warrant spraying, rather than spraying by schedule?				
• Use one of the five specifically defined types of conservation tillage (reduced till, mulch till, slot till, ridge till, or no-till? . . . . *(They reduce the amount of soil, chemicals & fertilizer that is eroded to surface waters.)*				
• Band herbicides, insecticides, and other chemicals, rather than broadcasting them, to cut your costs and reduce their potential for pollution?				
• Read the label before applying any chemical, and follow it?				
• Calibrate spray nozzles before use? .				
• Know about electrostatic sprayers? *(Greater % of spray stays on crop.)*				

**Even if you checked the YES or the No column you also should check the "Can Improve" if you think there's the slightest chance you could reduce your system's pollution potential and/or your production costs.*

DO YOU:	**Yes**	**No**	**Can Improve* Investigate**	**Does Not Apply**
• Mix and load chemicals and fertilizers at least 100 feet away from your well? *(The closer you are, the easier it is for spilled chemicals to get into well.)*				
• Use rubber gloves and boots when handling chemicals? *Leather absorbs chemicals and keeps it in contact with your skin for days.)*				
• Measure concentrates and dilutions accurately before adding to tank?				
• Drain the container into the spray tank by holding it in the vertical position for 30 seconds?				
• Triple rinse containers as soon as they are emptied before the residue dries?				
• Empty rinsate into your spray tank?				
• Have an air gap between the water supply hose and the top of your spray tank to prevent back-siphoning?				
• Have check valve and proper safety equipment on irrigation wells?				
• Pump tailwater pits often and reuse the water for irrigation to prevent chemical residue from leaching into groundwater?				
• Use irrigation scheduling? *(If soil is at field capacity, excess water and chemicals will likely move down past root zone.)*				

DO YOU:	**Yes**	**No**	**Can Improve* Investigate**	**Does Not Apply**
• Delay application to prevent wash-off or surface runoff if heavy rain is forecast?				
• Drive tractor into wind or at right angles to the wind whenever possible when spraying to prevent drift from getting on you?				
• Refrain from draining rinse water from equipment near or into ditches, streams, ponds, lakes or other water sources? . . . . *(Rinse waters containing any quantity of certain pesticides are classified as hazardous wastes according to state and federal laws.)*				
• Wear one of the new types of disposable coveralls when mixing or applying chemicals? . . . . *(It's not very expensive and they do a good job of protecting you.)*				
• Use Extension Service recommendations for washing spray clothes? . .				
• Use crop rotation to avoid buildup of pest populations and maintain or improve soil conditions?				
• Alternate pest control products and use crop varieties that are pest resistant?				
• Have general groundwater pollution liability insurance?				
• KEEP COMPLETE APPLICATION RECORDS? . . . . *i.e. which chemical, how much, application rate, date, time, temperature, wind conditions, which field, and reason for spraying.)*				

VII. CONTAINER DISPOSAL

DO YOU:	Yes	No	Can Improve* Investigate	Does Not Apply
• Return unopened chemicals for a refund?				
• Check the product label for specific container disposal instructions from the manufacturer?				
• Triple rinse and puncture metal pesticide containers and recycle or dispose of them in approved landfills?				
• Follow local and state laws on disposal of plastic and paper pesticide containers?				
• Live in an area that sponsors voluntary container collection programs? *(If not, you might want to help start one.)*				
• Burn plastic, paper, and other combustible materials after each day's use per application site?				
• Burn only in daylight hours and have one person responsible to be in attendance for the entire period of the burn?				
• Dispose of used motor oil at recycling centers?				

**Even if you checked the YES or the NO column you also should check the "Can Improve" if you think there's the slightest chance you could reduce your system's pollution potential and/or your production costs.*

VIII. HOW TO TAKE A WATER SAMPLE

Always contact the lab where you plan to have the water tested, and ask them for sampling methods, containers, and packaging and delivery instructions.

Your method and timing of taking a sample will vary slightly depending on which point in the system you are concerned about:

1. Actual quality of the main source of water, (groundwater, stream, river, or main distribution lines of a public water system). Remove the faucet's aerator, sterilize the faucet opening by flaming and let the water run for 10 minutes before taking the sample.
2. Condition of your water pipes or storage tanks. Remove the aerator from your faucet, sterilize the faucet opening with flame, and take the sample within 3 or 4 seconds after you turn the water on.

TYPE OF SAMPLING CONTAINER. For some tests, water samples can be submitted in a plastic bag or bottle. Other tests require special dark-colored glass bottles. ASK THE LAB!

TIMELINESS. Usually, it's best to test the sample as soon as possible. Labs should receive samples within 24 hours (48 hours at the latest).

HANDLING OF SAMPLE CONTAINERS.

- Do not touch the inside of the container or inside of the lid.
- Refrigerate or pack in ice and deliver to lab as quickly as possible if lab so instructs. (Don't throw the sample in the back seat and run all your errands before you stop at the lab.)
- Don't pump gasoline before taking the sample; ethylene dibromide (EDB) in the gasoline will evaporate off your hands into the sample.

For most accurate results, water samples should always be collected by a disinterested third party trained in proper sample collection procedures, and samples should be tested at an Environmental Protection Agency certified laboratory.

IX. RECOMMENDED INDIVIDUAL ACTIONS

1. Even if no obvious water problems exist, **household water supplies should be tested ANNUALLY** by your county or state Health Department for: pH, nitrates, total coliform bacteria, and total dissolved solids.

   Testing water for every contaminant is possible, but very expensive and not necessary. **It is more important to test on a regular basis for a few indicators of contamination and to maintain a record of water quality.** This helps to identify changes in the supply, contamination of the water source or deterioration of the water system. However, if you suspect other contaminants, test for them too.

2. Test livestock and poultry water supplies ANNUALLY for pH, total dissolved solids, sulfate, flouride, calcium, magnesium, iron, copper, arsenic, cadmium, lead, nitrate, barium, total coliform, fecal coliform bacteria, and total plate count.

3. Review this Checklist at the end of each calendar year and jot down which potential problem areas you improved on, and which ones you can work on in the coming year.

Record of Household Water Tests

Year	Date	pH 6.8 to 7.5*	Nitrates NO_3-N 10ppm*	Total Coliform Bacteria 0/100ml*	Total Dissolved Solids 500ppm*	Other
1987						
1988						
1989						
1990						
1991						
1992						
1993						
1994						
1995						
1996						
1997						
1998						
1999						
2000						

ppm = parts per million ml = milliliters
*ACCEPTABLE LIMITS WITHOUT TREATMENT

X. SUGGESTED LOCAL FARM BUREAU ACTIVITIES

- Help see that as many farmers as possible get to use this checklist at various meetings. At these meetings, always try to bring in a local water quality expert to make a presentation and answer questions.
- As an educational service, set up a booth at a county fair or a farm show or field day and test water samples for nitrates. (Pennsylvania Farmers Association (PFA) tested over 1,000 samples that farmers brought into PFA's booth at Ag Progress Days. Cost was only 20 cents/test.)
- Hold a county-wide Safe Drinking Water Clinic in cooperation with Extension Service, county Health Department, local well driller, and local water conditioning and testing companies. Pennsylvania Extension Service has an excellent model for this activity. (Your state Farm Bureau NER Coordinator can get more information about it from AFBF.)

If you have questions or want more information, call your:

- County Extension Agent
- Soil Conservation Service
- Local Water Testing Lab
- Regional U.S. EPA Office
- State Dept. of Agriculture
- State Health Dept.
- State Environmental Agency

FOR FURTHER READING:

Contact your state or county Farm Bureau office and request the publication: "Protecting our Groundwater, a Grower's Guide".

BACKGROUND: This checklist was developed as a result of a recommendation by the American Farm Bureau Federation's Special Study Committee on Environmental Pollution.

The committee report stated:

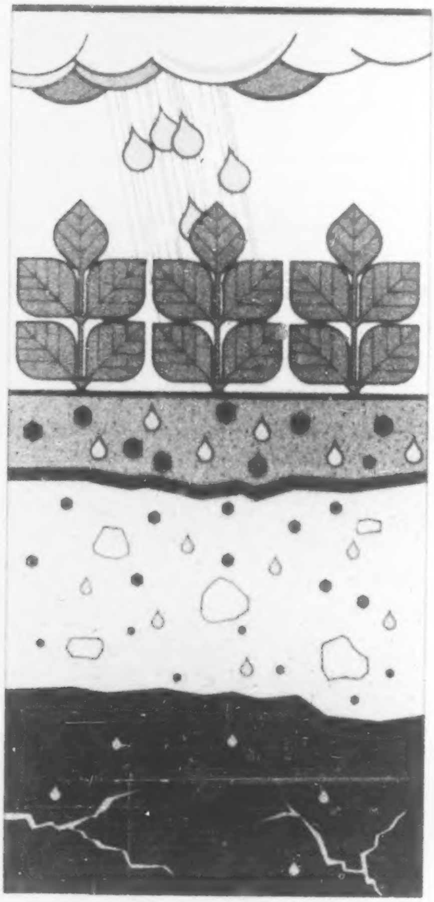
> Physical conditions affecting the vulnerability of groundwater to agricultural chemical contamination involve depth to the water table, recharge characteristics, aquifer media, soil types, topography, impact of unsaturated zone, and the conductivity of the unsaturated zone. All these discussions pointed to the "site specific" nature of the resource considerations.
>
> Information on farm management practicies that will reduce the potential for movement of agricultural chemicals downward into the groundwater is needed at the user level. . . There is also a need to promote increased understanding of practices that will improve nutrient management and minimize nitrogen losses to the environment.
>
> As part of the effort required to educate farmers on the safe, responsible practices in agricultural chemical use and environmental concerns, there could be made available through states an Environmental Audit Program for self-examination by individual farmers.
>
> The questionnaire/checklist type program would be designed to highlight the basic safe environmental checkpoints on the farm, for example safe storage and handling of agricultural chemicals, mixing and loading locations and techniques.

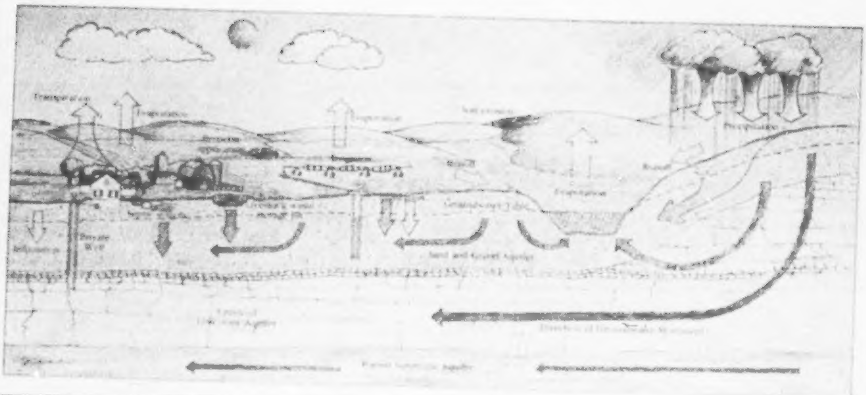
The Committee recommended that the self-help program be developed by AFBF "for dissemination to State Farm Bureaus for use at the County level by individual farmers."

Natural & Environmental Resources Division
225 Touhy Ave., Park Ridge, IL 60068 • 312-399-5700
American Farm Bureau Federation

PROTECTING OUR GROUNDWATER

A Grower's Guide





roundwater is an essential natural resource. Half the people in the United States—90 percent of rural residents—depend on groundwater as a source of drinking water. Concern about its quality and potential contamination has made groundwater protection a national issue.

Groundwater forms when water moves below the earth's surface and fills in empty spaces in and around rocks and porous materials. If enough gathers in one area, groundwater becomes the source of fresh water supplying wells and springs. Under certain conditions, contaminants—including soil nutrients, waste products, and chemicals—can migrate into groundwater sources.

Modern technology can detect extremely low concentrations of chemicals in groundwater. One group of chemical contaminants sometimes found in groundwater is pesticides. These products usually are applied to, or near, the surface of the ground. Five major factors determine whether they will reach groundwater:

- the practices followed by the chemical applicator,
- the presence (or absence) of surface water from rain or irrigation,
- the characteristics of the product being applied,
- the type of soil in the area of application,
- the location of the groundwater—its distance from the surface and the type of geological formations above it.

Only rarely does the combination of conditions occur which allows pesticides to reach groundwater. By being aware of these considerations, you can apply these products in ways which will make the potential for groundwater contamination even less likely.

By observing some simple precautions, applicators can reduce the risk of agricultural chemicals reaching groundwater.

Good Application Practices

Measure and mix carefully so that you will not apply more product than the label directs.

Follow Label Directions

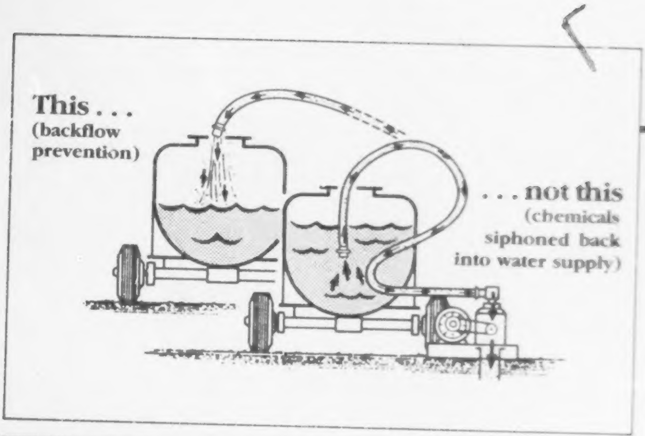
The best way to minimize groundwater contamination is to follow label directions exactly. The label's use instructions, approved by EPA, have been carefully developed after many years of study and testing. If you do not follow them, your treatment may not be effective, you increase the risk of contaminating groundwater, and you may be violating the law. Proper timing and placement of pesticide applications are very important.

Read the product label each time before use, and follow the directions exactly.

Mix and Calibrate Accurately

Avoid the temptation to use more product than the label directs. "Overdosing" will not do a better job of controlling the pests—it will only increase both the cost of pest control and the chance that the material may reach groundwater.

Most growers do not mean to exceed recommended label rates. But field checks have shown that mistakes in preparing tank mix concentrations and in calibrating application equipment often result in the application of too much chemical. Calibrate equipment carefully and recheck it often. Measure chemical concentrates and diluents accurately before adding them to the tank. Rough approximations can lead to serious overdoses.



Prevent back-siphoning of agrichemicals into the water supply by keeping the end of the fill hose above the water level in the spray tank.

Prevent Spills and Back-Siphoning

Agricultural chemicals spilled near wells or sinkholes can move into groundwater. Be careful to avoid spills when mixing and loading. To prevent back-siphoning from spray equipment into the well, **keep the end of the fill hose above the water level in the spray tank** at all times. Use an anti-backflow device when drawing mix water directly from a well or a pond. Inexpensive anti-backflow (back-siphoning prevention) devices for hoses that are used to fill farm sprayers can be purchased from irrigation or sprayer equipment suppliers. Such devices are required by law in some areas. Both private and commercial applicators should observe these precautions.

Dispose of Wastes Properly

Improper disposal of empty containers, equipment rinse water, or unused chemicals can cause localized groundwater problems. Dispose of all wastes in accordance with local, state, and federal laws.

Triple-rinse or pressure rinse your containers and pour the rinse water into the spray tank. If you have leftover product in your spray tank, dispose of it in a manner consistent with the product label. Avoid this situation in the first place by mixing only the quantities you need. Newer appli-

A good way to prepare containers for disposal is to pressure-rinse them, returning the rinse water to the spray tank.

Using traps to sample the level of insect population is an IPM technique which helps ensure that insecticides are applied only when necessary.

cation techniques involving chemical injection equipment and bulk handling procedures may further reduce the amounts of waste for disposal.

Do not drain rinse water from equipment near or into ditches, streams, ponds, lakes or other water sources. Rinse waters containing any quantity of certain pesticides are classified as hazardous wastes according to federal and state laws.

Under federal law, farmers may dispose of **their own** pesticide wastes on **their own** property in accordance with the product label. But consult your state hazardous waste agency for specific state requirements.

Excess surface water due to rain or over-irrigation increases the chance of pollutants moving downward to groundwater.

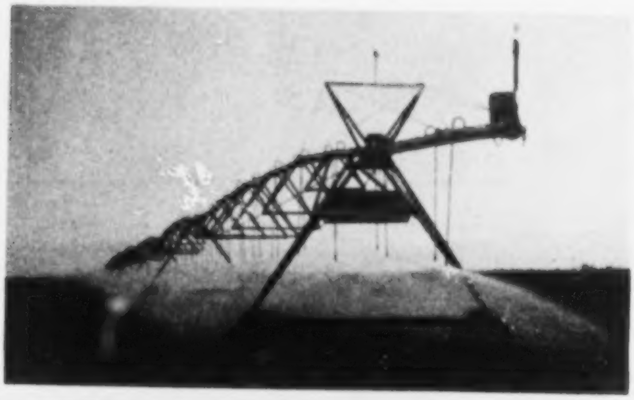
Use Integrated Pest Management

Integrated pest management (IPM) programs combine chemical use with many other production practices to manage pests in ways that are both economically and environmentally sound. These programs include such practices as crop rotation to avoid the buildup of pest populations and to maintain or improve soil conditions; the use of alternate pest control products and pest-resistant crop varieties; and careful pest monitoring to ensure that chemical methods are used only when needed.

You can get information about IPM programs from your local Cooperative Extension Service office.

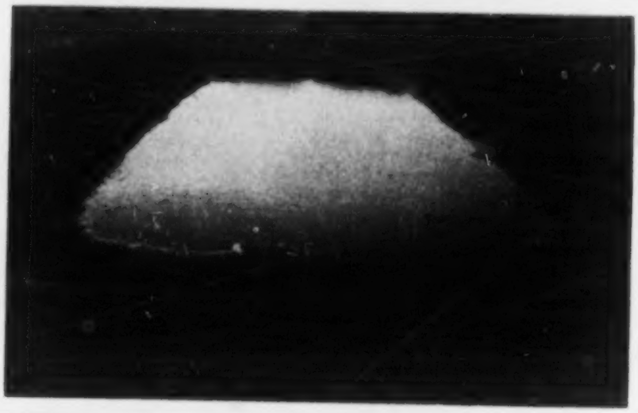
Consider Surface Water

If there is more water on the soil than the soil can hold, the water (with chemicals in it) is likely to move downward to the groundwater. Prolonged heavy rain or excessive irrigation will produce excess surface water. Use weather forecasts and observations and irrigation scheduling to predict when excess surface water may be a problem.



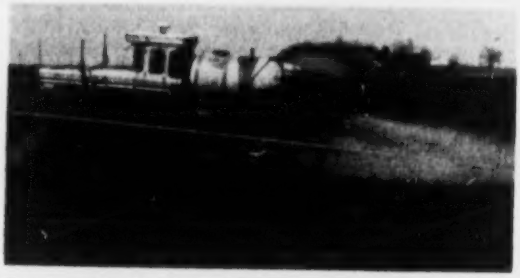
Coordinating irrigation with application of pest control products is essential to minimizing movement of chemical residues into groundwater.

- **Weather**—Long range weather forecasts predict the weather and probability of rain over a period of several days. Daily forecasts do an even better job of predicting the amount of rain to expect. Commonsense observations also can be helpful. If your own knowledge of local weather signs causes you to suspect heavy rain, it would be prudent to delay the application of certain products to prevent wash-off or surface runoff.
- **Irrigation**—Controlling the quantity and timing of irrigation water is also essential to minimizing chemical movement into groundwater. Be especially careful to prevent backflow into water sources, particularly if you apply pesticides through an overhead irrigation system. Do not let chemical residues leach from the tailwater pit into groundwater. Pump the pit often and reuse the water for irrigation. Do not introduce residues into underground water sources through recharge wells.



Good management techniques can help prevent chemical residues from leaching into groundwater from an irrigation tailwater pit.

Chemical, Soil, and Geological Factors



When choosing the best pest control product for the job, remember to consider how its characteristics will affect its potential for movement to groundwater.

Chemicals

Agricultural chemicals vary in their potential for moving to groundwater. Three major characteristics influence such movement:

- **Solubility**—Chemicals vary greatly in water solubility; the greater the water solubility, the more potential for movement of the product to groundwater.
- **Soil adsorption**—Some chemicals become tightly attached ("strongly adsorbed") to soil particles and do not move in the soil. Some are not so strongly adsorbed, and are more likely to move.
- **Persistence**—Some chemicals break down quickly; "persistent" materials take a long time to break down. The more persistent ones are more likely to reach groundwater over a period of time.

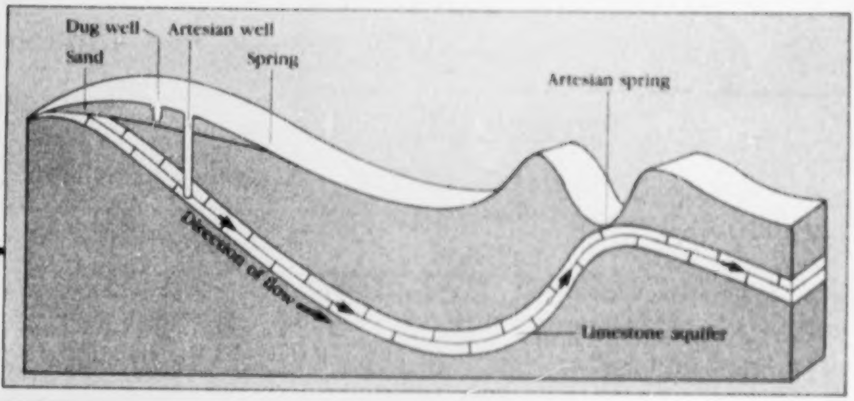
You can get more information on product characteristics from your Cooperative Extension Service or pesticide dealer.

Soil

Soil characteristics are also important in the movement of chemicals. Your local Soil Conservation Service can help you determine which types of soil are in your area.

Three major soil characteristics affect chemical movement:

- **Soil texture** is an indication of the relative proportions of sand, silt, and clay in the soil. Pest control products tend to be adsorbed mostly on clay and organic matter. Coarse, sandy soils generally allow water to move rapidly downward and offer few opportunities for adsorption. Finer textured soils generally allow water to move at much slower rates, and they contain more silt and organic matter to which pesticides and other chemicals may be adsorbed.
- **Soil permeability** is a general measure of how fast water can move downward in a particular soil. The more permeable soils must be carefully managed to prevent any form of chemical from reaching groundwater.
- **Soil organic matter** influences how much water the soil can hold before movement occurs. Increasing organic matter will increase the water-holding capacity of the soil. Some pesticides may also be adsorbed into organic matter.



Geology

Distance of groundwater from the surface is another important factor. If the groundwater is within a few feet of the soil surface, pollutants are more likely to reach it than if it occurs at greater depths.

The **permeability of geological layers** between the soil and groundwater is also important. If surface water can move quickly to the groundwater, the potential for pollutants reaching groundwater is increased.

Sinkholes are especially troublesome. Surface water often flows into sinkholes and disappears quickly into the groundwater. If a chemical is applied to an area that drains to a sinkhole, even a moderate rain or irrigation may carry some of the material directly to the groundwater.

Both the underlying geological formations and the distance of the groundwater from the surface affect the movement of surface-applied chemicals to groundwater.

Be especially careful when applying agricultural chemicals in an area where sinkholes are present, because they may allow runoff or spills to move directly into groundwater.

Putting It All Together

If . . .	Then . . .
you are mixing or applying agricultural chemicals near a well (including center-pivot irrigation wells)	do not dispose of leftover spray mix near a well; prevent back-siphoning from sprayer tank; avoid spills or clean them up; use anti-backflow valves on center-pivot systems.
you are applying agricultural chemicals on sandy soil with low organic matter content or to a field where the groundwater is near the soil surface	be aware that a product with higher water solubility, longer persistence, and low soil adsorption has a greater probability of reaching groundwater. Use the lowest effective rate recommended for this soil type. Use IPM practices whenever possible.
you are mixing or applying agricultural chemicals near sinkholes or areas draining directly into rivers or streams	remember that surface runoff or spills can wash directly into the sinkhole or the stream. Leave an adequate untreated barrier immediately surrounding the sinkhole or drainage area. Do not dispose of chemical products or waste materials in drainage areas near sinkholes, or near streams.
you need further information on soils, location of groundwater, or agricultural chemical products	consult your Cooperative Extension Service, the Soil Conservation Service, or your farm service representative or dealer for advice.

STATEMENT OF
MARIAN MLAY
DIRECTOR, OFFICE OF GROUND-WATER PROTECTION
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON GOVERNMENT EFFICIENCY, FEDERALISM, AND THE DISTRICT OF COLUMBIA
OF THE
COMMITTEE ON GOVERNMENTAL AFFAIRS
UNITED STATES SENATE

May 18, 1988

Good morning, Chairman Sasser, Senator Heinz, and members of the Subcommittee. I am Marian Mlay, Director of the Office of Ground-Water Protection at the United States Environmental Protection Agency (EPA). With me today is John H. Skinner, Director of the Office of Environmental Engineering and Technology Demonstration. We are pleased to be here today to talk about one of the nation's important environmental issues--the protection of the quality of this nation's ground water.

The Subcommittee has specifically expressed its interest in hearing the views of EPA on S. 1992, a bill to promote intergovernmental and interagency cooperation in the development of ground-water policy. Before providing you with our specific comments on this piece of legislation, and before providing you with the answers to the questionnaire which you submitted, I believe that it is important for me to present some background on EPA's ground-water protection efforts. Understanding what EPA is doing to protect ground water, and how it is being done, will help you to understand the Agency's perspective on the issue of most interest to this Subcommittee--coordination of ground-water protection efforts at the federal level.

Ground-water protection is one of EPA's top priorities. Many of our programs and a large percentage of our budget directly support the protection of ground-water quality. As your Subcommittee begins its review of the country's current efforts to protect this vital resource, I would like to describe briefly for you three areas related to EPA's ground-water protection program: 1) the extent of our knowledge of the resource and threats to its usability; 2) the authorities for protecting ground water under existing federal statutes; and, 3) principles which EPA believes should guide our future efforts to protect the resource from contamination.

Characteristics of the Ground-Water Resource

The importance of safeguarding ground-water quality is increasingly being recognized. About one-fourth of all the fresh water used in this country comes from underground. Ground water currently supplies 50% of the population's drinking water. It provides 35% of the drinking water supply used in urban areas and 95% of the supply in rural areas. One-third of the water used for irrigation in this country is drawn from underground. For the eastern industrial States, 30% of the ground water withdrawn is for use in industrial processes.

Although we are constantly expanding our understanding of the nature of ground water and the extent of contamination, we may never have a complete picture. Our current data on contamination by organic substances are fairly limited, and monitoring is very expensive and technically difficult. The best indicator we have of the extent of contamination comes from a national survey of volatile organic compounds (VOCs) in drinking water wells. We found that only about 2.5% of all public drinking water systems relying on ground water exceed the standards for VOCs. In addition, the survey showed that nearly 20% of all drinking water systems using ground water, and nearly 30% of the larger ground-water systems, contain between trace levels and levels above recommended advisories and current standards.

Over the years, our experience at EPA has shown that once ground water is contaminated, cleaning it up is difficult, expensive, and sometimes not completely successful, especially at low levels of contamination. For many reasons, the clean-up of ground-water contamination is substantially more complex than the clean-up of surface water pollution. One reason is that the rates of movement and mixing of ground water are dramatically different from those for surface water: ground water usually flows at a feet-per-year rate while surface waters flow at a feet-per-second rate. Second, the contaminants may not be easily desorbed (released) from certain types of soils. Depending on the chemical properties of the contaminant and the organic content of the soil, the rate of desorbtion can be very slow. Third, ground water is not as easily accessible for monitoring. In fact, taking a sample of ground water usually involves the expense of drilling wells, and the information obtained may sometimes be quite different from data from a sample obtained only a short distance away. This means that it is nearly impossible to obtain a representative sample characterizing an entire aquifer. In addition, there is a shortage of highly skilled people to collect and analyze such data.

Another important reason why protecting this resource is one of our most complex environmental challenges is that there is a wide variety of potential individual sources of ground water contamination ranging from large commercial and industrial practices to small businesses, farmers, and home owners. The total number of potential individual sources includes: approximately 1500 hazardous waste land disposal facilities; over a 1000 toxic waste sites; thousands of surface impoundments; 70,000 non-hazardous waste land disposal facilities; hundreds of thousands of injection wells; over a million under-ground storage tanks; 23 million residential septic systems; and the use of millions of pounds of pesticides and millions of tons of fertilizers by farmers, home owners and others. Many of these potential sources of contamination already are under regulation by federal, State, and local authorities. In short, protecting ground water is a complex undertaking and requires that federal, State, and local governments work in concert to address such large numbers and varieties of sources. Since State and local governments are in the best position to make decisions about appropriate action in individual circumstances, they, of course, should have the lead role.

Statutory Authorities

As I just noted, many sources of ground-water contamination are already being addressed under the authority of existing federal environmental statutes. Let me summarize briefly a few of these authorities.

The Resource Conservation and Recovery Act of 1976 (RCRA) and its 1984 amendments require controls on hazardous waste management to protect ground water from contamination originating in hazardous waste facilities, municipal landfills, surface impoundments and underground tanks.

The Comprehensive Environmental Response, Compensation and Liability Act (Superfund) provides EPA with major authorities and resources to clean up historical and current releases of hazardous substances to the environment. A significant portion of the work under this statute involves ground-water protection and remediation.

Through the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), we control the availability and the use of pesticides which may present an unreasonable risk to human health or the environment if they leach into ground water. In support of the Agency's mandate in this area, we have released for public comment our proposed strategy for addressing the pesticides in ground water issue. We are also working on a National Pesticides Survey to help us assess the extent to which pesticides are leaching into drinking water wells. This survey will provide valuable information to support our activities under both FIFRA and the Safe Drinking Water Act (SDWA).

Under the SDWA, the Agency sets drinking water standards to ensure that water delivered to the tap is safe to drink. These standards, in turn, are used as reference points in many ground-water quality management decisions under statutes like RCRA, Superfund, and FIFRA. The SDWA also mandates control of the underground injection of hazardous and other fluids.

EPA's efforts are not, however, strictly regulatory in nature. We also provide assistance to States for the development and implementation of State ground-water protection strategies. Through the authority of the Clean Water Act, we have awarded the States slightly over $27 million dollars since 1985 to help them develop their strategies. And under the SDWA Amendments of 1986, we are providing guidance to assist States in developing wellhead protection programs to protect the ground water entering the wells or wellfields of public water systems.

Through these and other statutes, a wide range of activities including standard setting, institution building, technical assistance, compliance, enforcement, research, and monitoring take place. In fact, last year the Agency released a report summarizing all of the Agency's activities that address the 33 sources of ground-water contamination that were identified by the Office of Technology Assessment (OTA) in a 1984 report. Our report lists some 270 EPA activities and programs, and points out that the Agency is addressing--either through regulatory programs or through non-regulatory efforts such as technical assistance, guidance, studies and research--25 of OTA's list of 33. Most major sources are being addressed. Not surprisingly, the Agency has a higher level of activity focused on sources that are directly regulated under EPA's statutory mandates. For the eight sources not addressed, they are either more appropriately addressed at the State or local level (like material stockpiles, graveyards, or animal feedlots) or are from natural causes which we cannot address with protection activities.

I would also like to point out to the Subcommittee members that over the years EPA has developed a substantial ground-water research program to support our legislative mandates. Currently,this program includes a wide variety of research, development and monitoring efforts that are required to support our regulatory development, compliance, enforcement and ground-water clean-up responsibilities.

Other federal agencies also play major roles in the management of ground water: land management agencies within the DOI and the USDA; agencies which manage ground water at the facilities under their control such as the Department of Energy, the Nuclear Regulatory Commission, and the Department of Defense;and finally, agencies which characterize and map the ground-water resource such as the USGS and the USDA. Naturally, in order to foster consistency, EPA meets often and regularly with these Agencies to discuss and coordinate the ground-water protection and management activities.

It is clear, then, that existing statutes already provide the federal government with significant authority to address ground-water protection and management in many different ways.

Principles to Guide Our Future Efforts

In the late 1970s, EPA recognized that the Agency's role in the area of ground-water protection was fragmented and largely undefined. As a result, in 1984, the Agency adopted a Ground-Water Protection Strategy that articulated principles that should guide EPA as it set about addressing the ground-water protection challenge. Administrator Lee Thomas recently noted in testimony before the Senate Environment and Public Works Committee that the principles set forth in our Strategy should continue to guide future national efforts to protect the resource. I would like to outline for you four principles in the strategy that we hope you will seriously consider in your discussions about the future direction of ground-water policy in this country. **First, the States should continue to have the primary role in the protection of the quality of the ground water resource.** Such protection inevitably requires decisions about land use, including the siting of various types of facilities as well as the allocation of water resources which are appropriately the province of State and local governments. There is widespread agreement on this point among those who are concerned about ground water. For example, the Conservation Foundation, the

Business Roundtable and the National Governors' Association are on record in agreement with this principle.

At this time, the States are actively involved in protecting the quality of their ground-water resources. All States have developed or are developing ground-water protection strategies. This is due, in part, to the State ground-water strategy grants program under section 106 of the Clean Water Act.

Most State strategies not only attempt to develop comprehensive long-range frameworks for protecting the resource, but they also seek to institutionalize ground-water protection at the State and local levels. State agencies are working with their legislatures to assign a higher priority to ground-water management and to provide more State money for protecting the resource. States have also begun to map and characterize their ground waters, develop classification systems, implement quality standards and lay a sound foundation for developing wellhead protection programs. Consequently, most State and local governments have their own regulations and ordinances to protect ground water.

Second, while the States should continue their primary role in the comprehensive management of ground water as a resource, there is an important role for the federal government to play. **The federal government has an appropriate role in controlling the use of certain toxic chemicals of national concern, in setting protective standards for major sources of contamination, in providing technical assistance, and in research and**

development in support of protection, management, and clean-up activities. The federal role has been recognized by EPA in our Strategy and, as described earlier, EPA also has been given authority to deal with contaminants of national concern under several statutes.

The third principle is referred to at EPA as differential protection. **Differential protection means that the variability in use, value, and vulnerability of the ground-water resource is taken into account as decisions are made as to how to protect the quality of the resource.** At EPA, we have developed a three-tiered classification system for ground water to assist us in taking this variability into account. Differential protection is a way of focusing EPA's and society's resources on the most important areas as well as affording the greatest protection where the greatest potential risk to public health and the environment is presented. Thirty-three States have adopted their own classification systems, recognizing that differential protection is the most logical and efficient way of protecting ground water. The concept of differential protection has been endorsed by major national groups including the National Governors' Association and the Conservation Foundation.

Closely tied to the concept of differential protection is the fourth principle that the Administrator believes should guide our future efforts: **we must distinguish between prevention and corrective action in our decision making, and we must put more emphasis on prevention.** The Agency has usually found that it is usually much more expensive to clean up contamination, especially at low levels, than it is to prevent it.

One issue the Agency is facing over and over again at Superfund sites is the issue of how we allocate our limited ground-water protection resources. We are being pushed to spend hundreds of millions of dollars at Superfund sites to clean up very small levels of chemical contaminants that, in some cases, pose low risks to human health. Clearly, it makes more sense to recognize that there is a level below which there is no significant health threat, and to try to direct more of our resources toward prevention of future contamination. Federal, State, and local ground-water protection programs should have the flexibility to evaluate clean-up and prevention strategies separately and to direct resources commensurate to the relative risk into either prevention or cleanup activities.

There is one other point that needs to be made. The Administrator, in his recent Senate testimony, stated that it is important in any discussion of ground-water policy to bear in mind where the problem of contamination fits in the context of risks posed by other environmental problems as a whole. EPA recently undertook a comparative evaluation of 31 environmental problems from the standpoint of the risks to the total population they pose to human health and the environment. The risks posed by contamination from sources such as leaking storage tanks and active and inactive hazardous waste sites, pesticides and other sources of ground-water contamination ranked low to medium when compared to other pollution problems like air pollution. The Administrator therefore believes that the relative risk of ground water vis-a-vis other environmental problems should be kept in mind as we address the ground-water issue.

EPA's Comments on S. 1992

The Subcommittee has asked for EPA's specific comments on S. 1992, a bill to promote intergovernmental and interagency cooperation in the development of ground-water policy. I would be happy to present the Agency's comments at this time.

One of the underlying premises of S. 1992 is that there is a lack of coordination in federal ground-water protection efforts which results in inappropriate duplication and overlap in responsibilities among federal agencies. EPA strongly disagrees with this premise; therefore, EPA opposes S. 1992.

In the previous part of this testimony I described EPA's ground-water protection efforts. As I attempted to make clear, EPA's mission as regards ground-water protection is firmly rooted in its statutory responsibilities. The federal statutes which I described in the section entitled "Statutory Responsibilities" in large part define EPA's regulatory and State program-support mission. Certain statutes give EPA broad authority to regulate certain ground-water contaminating sources from the perspective of protecting human health and the environment. Other statutes, such as the CWA and the SDWA, have EPA assisting States in the development of their own ground-water protection programs.

Other federal agencies have different missions regarding ground-water protection and management resulting from different statutory responsibilities. For example, the USGS in the Department of Interior has a scientific mission. On the other hand, the Departments of Energy and Defense have certain statutory responsibilities to regulate facilities and activities under their authority which impact ground water.

Differences in the missions of the various federal agencies with ground-water protection responsibilities affect the need for and the proper extent of interagency coordination. Thus, the differences in mission need to be recognized in any discussion of coordination. Furthermore, because of differences in agency missions, there may be some ground-water protection efforts among federal agencies which may be duplicative, though such duplication may not be inappropriate or unnecessary. Some duplication and some overlap are not necessarily bad. For example, it may allow research scientists to cross-check their methods and results or research conclusions. Also, to the extent that any duplication of ground-water protection efforts may exist at the federal level, it may be a necessary result of different statutorily-rooted missions. We are not aware of any examples of wasteful or harmful duplication.

Section 2(b) of S. 1992 would require the President to establish an Interagency Committee on Ground Water Protection. This Committee would be co-chaired by the Director of USGS and the Administrator of EPA and would include, as members, representatives from each federal agency involved in ground-water related activities. The duties of the Committee would include, among other things, reviewing the activities of each member agency to ensure coordination among such agencies, and identifying and eliminating duplications and overlap between or among programs of member agencies.

Coordination of the ground-water protection programs of federal agencies is certainly desirable. However, there is simply no need for a statutorily-mandated Committee designating lead agencies as is set forth in S. 1992. The creation of such a Committee could result in having the Committee interfere with the ability of individual agencies to carry out their statutorily-mandated missions by making procedures more complex and burdensome. More importantly, any attempt to designate which agencies, out of all the federal agencies engaged in ground-water protection activities, are "lead agencies" in this regards would be detrimental and could conflict with the agencies' statutory mandates. EPA believes that it is important to have a number of federal agencies working on ground-water protection; indeed, as I have pointed out, federal statutes already require this.

The way to ensure that inappropriate duplication of effort is not taking place at the federal level is to have the agencies talking and working with each other. The President and the federal agencies already have in place a number of existing mechanisms for appropriate coordination of ground-water protection efforts. One new example is the Federal Coordinating

Council on Science, Engineering, and Technology (FCCSET) which has recently established a subcommittee to provide a forum for coordinating federal agency science and technology programs related to ground water. Other mechanisms include memoranda of understanding among federal agencies (USDA, DOI, EPA) and the creation of many special, more focused staff-level groups to work together so that each agency can advance its statutorily-mandated missions. Additionally, the development of the President's annual budget proposal as well as Executive Order 12498--"Regulatory Planning Process"--provides the executive branch with an extensive opportunity to review, coordinate, and modify federal programs.

EPA coordinates its ground-water protection activities with every federal agency having a ground-water protection mission, including: the Department of Interior, the Department of Agriculture, the Department of Defense, and the Department of Energy. As a partial listing of these coordination activities I have attached to this testimony, as an appendix, a listing of the 77 coordination activities (some of which are policy coordination and others of which involve coordination for specific issues) in which EPA is involved with the Departments of Interior and Agriculture; we have many other coordination activities with these departments as well as with other federal agencies. This list includes numerous coordination committees, other task groups with a broad focus on coordination activities, and other groups with a focus on specific ground-water issues. The coordination activities currently in effect, as listed in the Appendix, were undertaken to support the efficient administration of EPA's and the other agencies' separate and distinct statutory responsibilities.

In short, EPA believes that current coordination efforts among federal agencies in ground-water program activities are working, and that S. 1992 is unnecessary and may, in fact, complicate and impede agency efforts.

Answers to the Specific Questions Posed by the Subcommittee

The questionnaire presented to EPA by the Subcommittee contains five questions concerning ground-water policy and coordination. I would now like to take the opportunity to provide you with EPA's answers to the questions you have asked.

Q1. A more comprehensive federal ground-water protection policy and better interagency and intergovernmental coordination have often been urged; do you agree that S. 1992 addresses those needs?

I will first address one of the underlying premises of your question--that there is a need for more comprehensive ground-water protection policy. In a previous section of my testimony entitled "Principles to Guide Our Future Efforts," I outlined four aspects of EPA's Ground-Water Protection Strategy which the Agency believes should be a part of any discussion about the future direction of ground-water protection policy. Consistent with our Strategy, and based on our experience in the administration of our statutes, EPA already is, through administrative means, integrating and strengthening the implementation of existing statutes around three basic premises which the Administrator noted in his recent Senate testimony:

- EPA should have clear authority to harmonize the implementation of its various programs, and to establish a consistent health-protective reference point for decision-making regarding protection and cleanup for all ground-water programs.
- The use, value, and vulnerability of ground water should be clearly factored into EPA decisionmaking. We would like to see EPA's differential protection policy as delineated in the Ground-Water Protection Strategy become federal policy because it would focus attention on the most important areas.
- The ability to have flexibility within a structured decision making process, i.e., the ability to deviate from the basic reference point for protection and cleanup activities in carefully defined cases, should be clearly established.

Therefore, in light of the Agency's ongoing ground-water related activities to implement these basic premises, EPA does not believe that there is a need for a more-comprehensive federal ground-water protection policy.

Concerning the second premise of your question--that there needs to be "better interagency and intergovernmental coordination" of ground-water activities, I am certain that the part of my testimony which addresses S. 1992 makes it clear that

EPA believes that no further formal coordination mechanisms are necessary. EPA believes that current coordination mechanisms are sufficient and that federal agencies are working hard to make these coordination mechanisms serve their respective statutory responsibilities.

Consequently, we believe that S. 1992 is not needed to assure that federal ground-water policy to be effective, efficient, or coordinated.

Q2. Would comprehensive federal ground-water protection policy and the accompanying federal oversight and guidance dilute or reinforce existing State and local policies?

A comprehensive federal ground-water protection policy and accompanying federal oversight and guidance would not necessarily either dilute or reinforce existing State and local policies; it would all depend upon the policy set forth.

However, a comprehensive federal protection policy is unnecessary.

Q3. If the primary responsibility for ground water policy-making were to reside with the federal government, which agency(ies) should set it?

The protection of ground water is a national issue for which existing federal environmental statutes enacted by Congress have already established certain national policies protecting ground water from contamination. Although there is indeed an important federal role in ground-water protection, it is EPA's policy--and the Administrator believes that it should be national policy--

that the primary responsibility for ground-water management should reside with State and local governments.

As explained in earlier parts of this testimony, EPA has administratively established principles or policies for ground-water protection which are consistent with its environmental protection mission as set forth in the federal statutes administered by this Agency. Different agencies address different aspects of the ground-water research, protection, and management effort, according to these agencies' missions, as embodied in federal statutes they administer. A uniform policy set by one agency would not necessarily be appropriate for another. In addition, each federal agency must meet the statutes and regulations that EPA administers to the extent required by law, e.g. application of RCRA at federal facilities. Consequently, each federal agency, in accordance with its statutorily-defined mission, and also in accordance with certain environmental statutes implemented by EPA, has responsibilities for certain aspects of ground-water policy.

Q4. Cite any exemplary State, local, or federal coordinated ground-water management efforts which you are aware of that could serve as a model for any future coordinated federal interagency entity.

EPA currently has a large number of interagency efforts under way at all levels and in all parts of its organization. The list in the Appendix summarizes those activities which involve only EPA and the DOI and USDA on a variety of ground water quality issues. Several Memoranda of Understanding provide for coordination among EPA, DOI, and USDA on a variety of water quality issues. EPA also has similar agreements with the departments of Defense and Energy. These agreements do not implement themselves. Rather, implementation occurs through periodic general meetings, but more importantly, through specific projects which deal with the design of a program or a study, or the joint implementation of an effort.

Two recent examples are: EPA's proposed Agricultural Chemicals in Ground Water Strategy, and an EPA/USGS workshop on hydrogeologic mapping needs for ground water protection. The first was developed with extensive input from federal agencies, State and local governments, and the private sector over a two year period. The goal of this Strategy is to better protect ground water from unreasonable agricultural chemical risks, and the Strategy calls for greater involvement of States and the USDA in this endeavor.

Similarly, EPA's Office of Ground-Water Protection and the DOI's USGS completed, last week, a "Workshop on Hydrogeologic Mapping Needs for Ground-Water Protection and Management." The purpose of this workshop was twofold: (1) to increase the cooperation between EPA and DOI in the area of mapping for ground water protection purposes; and (2) to direct this joint federal effort toward meeting the needs of State and local government for maps related to ground water protection.

A different type of EPA-interagency effort is the implementation of environmental protection statutes at federal facilities. To assure a coordinated effort between EPA programs and the federal facilities which carry out these requirements for their areas of jurisdiction, EPA's Office of Federal Activities carries out extensive coordination and oversight activities which involve ongoing meetings and interchange with all relevant Agencies.

USGS, as they will point out, has different types of coordination activities. For example, they chair an Interagency Advisory Committee on Water Data which has a Subcommittee on Ground Water. The Subcommittee chairmanship rotates annually; this year EPA is chairing the Subcommittee. It works on such issues as quality assurance of ground-water data, data integrity, Geographic Information Systems, and an interagency ground water glossary.

Each of these interagency efforts reflect each Agency's ongoing need to carry out its statutorily-mandated responsibilities. EPA's responsibility is to carry out its ground water protection mission; USGS's is to carry out its scientific and technical mission.

One area for coordination, ground-water research, is considered to have sufficient multiple-purposes to involve a larger group of agencies; a coordinating role is under way through the Federal Coordinating Committee for Science, Engineering and Technology. This Committee has a new Ground Water Subcommittee of its Earth Sciences committee. The Subcommittee is finalizing its charter at this time, but will likely be focusing on scientific and technical issues common to most agencies with ground water programs.

Coordination at the State and local levels with federal agencies takes place through EPA regional Ground Water Offices which have been explicitly established as focal points for this purpose. Many of these activities are listed in the Appendix, and they are similar to a project in Massachusetts entitled the "Cape Cod Aquifer Management Project (CCAMP)." This project is a cooperative effort to assess a problem and craft a solution. The project involves EPA, the USGS, and State and local agencies.

None of these coordination activities provide a model for a federal interagency entity because each is crafted to meet a specific objective. It is our experience that diverse, general purpose working groups have not been particularly successful in the past. Consequently, rather than an overall interagency entity, EPA and other agencies have agreements and implementation activities which are project-specific. Therefore, there is not a federal, State, or local model for an interagency entity.

Q5. Cite any examples of the inefficiency or ineffectiveness of federal and State attempts to coordinate ground-water management efforts which you are aware of that serve to illustrate the need for change along the lines envisioned by S. 1992.

Federal and State governments have made excellent progress over the last ten years in building coordinated approaches to protect ground water quality. EPA has led the way with the development of its Ground Water Protection Strategy developed in the early 1980's with the full cooperation of other federal agencies. The Departments of Agriculture, Defense, Energy, and Interior have also developed initiatives, some of an interagency nature, to assess, protect, and clean up ground water. The Appendix list of coordination activities is a good example of the activities currently being implemented among EPA and DOI and USDA. Similar lists could be drawn up regarding the other agencies.

All States have either developed or are developing ground water strategies to develop and implement State ground water protection efforts using, in part, EPA funds under the Clean Water Act. These strategies stress coordination among State agencies as well as with relevant federal agencies. The EPA regional Ground Water Offices serve as a focal point for coordination of ground-water issues among EPA programs, the States, and federal agencies.

Federal and State coordination activities on an interagency and intergovernmental basis will continue to improve. A new organizational entity does not appear to be the solution, and may in fact interfere with this process. Furthermore, the federal and State activities of the past 10 years have been moving forward to accomplish increased efficiency and effectiveness in these efforts. We strongly believe that we are on the correct path and that additional federal legislation is not needed to motivate either the federal government or State governments, nor is there a need to add another committee to those which already exist.

This concludes my prepared testimony. We would be happy to answer your questions at this time.

APPENDIX

EPA COORDINATION WITH THE DEPARTMENTS OF INTERIOR AND AGRICULTURE ON GROUND WATER PROTECTION

I. COORDINATION COMMITTEES AND OTHER ACTIVITIES ESTABLISHED BY MEMORANDUM OF UNDERSTANDING OR OTHER AGREEMENTS

1. Standing EPA/USGS Coordinating Committee to coordinate areas of interface, facilitate information exchange, and resolve conflicts between the two agencies. Established by MOU.

2. EPA/USGS Memorandum of Understanding on Ground Water Research, training and monitoring.

3. EPA/USDA Committee to develop regulations for the Conservation Reserve Program (CRP) under the Food Security Act (1985). This workgroup examines, among other issues, how CRP could be used to provide wellhead protection for drinking water wells, by reducing the potential for agricultural chemicals to leach into ground water.

4. EPA (OA)/USDA - MOU to support common objectives, interests, and statutory requirements. It identifies/defines general principles of cooperation, coordination and communication between the two agencies.

5. EPA/USDA (Forest Service) - MOU provides for a continuing working relationship between the agencies to support common objectives/interests and statutory requirements and to avoid duplication.

6. EPA/DOI - MOU to coordinate programs of common interest: U.S. Fish and Wildlife Service, National Park Service, Heritage Conservation and Recreation Service (HCRS) with the water quality management process administered by EPA under sections 201, 208, 303 of the CWA.

7. EPA (OGWP)/DOI (USGS)/Other Agencies - Ground-Water Subcommittee of the Interagency Advisory Committee on Water Data. Meets bi-monthly to discuss interagency needs and issues on ground-water data management.

8. EPA (OGWP,OWRS)/DOI (USGS) - National Coordinating Workgroup of the National Water Quality Assessment (NAWQA) Program meets twice a year to review and comment on the pilot NAWQA studies.

II. INTERPROGRAM COOPERATION EFFORTS

9. EPA (OSWER)/USDA - OSWER supports USDA employee attendance at EPA's emergency response team meetings; and EPA's emergency response teams respond to contamination emergencies which may affect ground water.

10. EPA (OSWER)/DOI - OSWER provides funding to support DOI's CERCLA responsibilities as amended by SARA (1986) and Executive Order 12580. This agreement covers emergency preparedness and response activities as well as funding DOI's damage assessment capability for individual Superfund sites.

11. EPA (OSWER)/DOI (USGS) - OSWER provides support funding for USGS enforcement services, including: technical review of workplans, oversight of remedial investigation/feasibility studies, specialized field studies to augment potentially responsible party studies, hydrogeological investigations to confirm liability, and special studies in support of ground-water monitoring.

12. EPA (OW)/USDA/DOI - These agencies work cooperatively at Headquarters and in the Regions on EPA's Pesticides in Ground Water Survey.

13. EPA (OW)/USDA (Extension Service) - Task group established to improve the distribution of technical assistance information on small community waste water treatment systems and encourage information exchange.

14. EPA (OGWP)/USGS - Cooperative effort underway, including a joint workshop with States, to determine types of hydrogeologic maps needed by Federal, State and local governmental environmental managers.

15. EPA (ORD)/USGS - A cooperative agreement provides coordination in conducting interdisciplinary field site investigations processes affecting the movement of hazardous substances through the subsurface.

16. EPA (ORD)/DOI (USGS) - Interagency Agreement (IAG) provides for development and field testing of methods to characterize the spatial heterogeneity of hydrologic properties in a coastal aquifer. A better quantitative understanding of effects of heterogeneity of hydrologic properties is needed to improve the ability to predict movements of contaminants in the subsurface. (Cape Cod, Mass.)

17. EPA (ORD)/DOI (USGS) - IAG to develop a field data base for the analysis of pesticide migration in the recharge area for ground water within the Dougherty Plain area of southwest Georgia. The data base will be used to develop and test predictive exposure assessment techniques currently under development.

18. EPA (ORD)/USDA - Communicate informally on research directed towards the impacts of pesticides, salinity, and nutrients on ground-water quality.

19. EPA (OSWER)/DOI - Superfund staff are developing a manual for conducting qualitative assessments of ecological harm at Superfund sites. DOI staff are participating in this effort.

20. EPA (OWRS)/USDA - MOU to coordinate rural clean water program implementation (Section 208(j) of CWA), which demonstrates the viability of a rural clean water program.

21. EPA (OSWER)/DOI (BOM) - MOU to facilitate mutual technical assistance efforts regarding inorganic wastes to improve site treatment technologies, and to maintain and supply information and expertise to assist EPA in meeting its regulatory responsibilities under CERCLA and Executive Order 12580.

22. EPA (ORD)/DOI (BOM) - MOU to promote and maintain cooperation and coordination of research efforts regarding environmental effects of mineral mining and recycling; and supplying information and expertise to assist EPA in meeting its regulatory responsibilities.

23. EPA (OWRS)/USDA (SCS) - MOU to establish policies and administrative procedures within each state to develop state-level agreements with SCS for planning and implementation efforts including reimbursement for technical assistance provided by SCS for projects under Clean Lakes Program (authorized by Section 314 of CWA).

24. EPA (OPP)/DOI (USGS) - IAG for ground water projects related to pesticides. Focus of IAG is field and analytical work to demonstrate the relationship between land-use and ground-water quality, to assure assistance in developing ground-water monitoring guidelines, and to assure rapid provision of technical assistance in a crisis situation.

25. EPA (OW)/USDA (Extension Service) - Representatives meet regularly to discuss USDA assistance to nonpoint source program as well as timely information flow. Assistance includes County Extension and ASCS Agents sharing information on cropping patterns and pesticide usage in the 90 counties where domestic wells are sampled by the Non-Point Source Program.

26. EPA (OW)/DOI (USGS) - Representatives meet frequently to coordinate data collection variables, management of collected data (USGS & STORET), explore joint application of Geographic Information Systems, and coordinate analysis of pesticide data with hydrogeologic vulnerability.

27. EPA/(ODW)/DOI (BLM) -EPA regional offices and agencies work on underground injection control (UIC) programs on Federal lands.

28. EPA (ODW)/DOE/DOI - Task group to participate in Underground Injection Control Class II (oil and gas) well corrections planning.

29. EPA (ODW)/DOI/USDA/Others - Several workgroups are focusing on Class V Underground Injection Control wells.

30. EPA (R. 6-10)/DOI (BuRec-USGS) - Task group and working relationship with BuRec on the review of proposed projects under the High Plains Aquifer Demonstration Project.

31. EPA (R. I)/USGS - MOU to provide technical support for the Superfund program.

32. EPA (R. I)/USGS - IAG to cooperate on Cape Cod golf course pesticide study.

33. EPA (R. I)/USGS - IAG to cooperate on Cape Cod Aquifer Management Project (CCAMP).

34. EPA (R. I)/DOI (USGS) - Conduct joint demonstration project using GIS to address the risks to public ground-water supply from a variety of contaminant sources.

35. EPA (R. II)/USGS (NJ) - EPA contract with New Jersey District Office to provide technical support on Sole Source Aquifers.

36. EPA (R. II)/DOI (USGS) - Joint project to prepare a hydrogeologic atlas of Puerto Rican and Virgin Island Aquifers.

37. EPA (R. II)/DOI (USGS) - Jointly conducting hydrogeologic mapping and geochemistry data gathering.

38. EPA (R. II & III)/USGS - Proposing an IAG on ground-water relationships.

39. EPA (OGWP, R. III)/USGS - Project to collect data on the hydrogeology of Chincoteague Island, wetlands and tidal areas.

40. EPA (R. III)/USGS - Conducting GIS mapping and gathering technical data towards a managment strategy for the Elizabeth River Basin, as part of the Chesapeake Bay Program.

41. EPA (R. III)/USGS - Participation in the NAWQA Study on the Delmarva Peninsula.

42. EPA (R. IV)/USGS - With Alabama Department of Environmental Management, to identify high priority ground water resources and critical recharge areas.

43. EPA (R. IV)/USGS - The Florida Department of Environmental Regulation and Florida Water Management Districts have established Technical Advisory Committees composed of EPA, USGS and State personnel to oversee aspects of the State Underground Injection Control Program.

44. EPA (R. IV)/USGS - A joint pilot project to develop databases to support toxic and risk management decisions relating to Georgia's ground water.

45. EPA (R. IV)/USGS/Florida DER - Jointly producing maps and developing hydrogeologic data relevant to Florida's aquifers and wellhead protection programs.

46. EPA (R. IV)/USGS - Project to develop wellhead protection and ground-water flow data for Louisville, KY.

47. EPA (R. VI)/USGS - Participation in the NAWQA Central Oklahoma Project.

48. EPA (R. VI)/several Federal agencies-Spring 1988 workshop to address nonpoint source problems.

49. EPA (R. VI)/DOI/USDA - Region planning seminar with these and other Federal agencies regarding wellhead protection and sole source aquifers in August 1988.

50. EPA (R. VI)/USDA (SCS and FmHA) - MOUs to coordinate reviews of Federally assisted projects over the Edwards Sole Source Aquifer.

51. EPA (OGWP-R. VII)/USDA (ARS) - ARS is holding a workshop on Managing Nitrogen for Groundwater Quality and Farm Profitability, out of which will be developed a field manual.

52. EPA (R. VII)/USDA (ARS) - Work with ARS and Extension personnel regarding possible EPA funding of ground-water research on irrigation test plots at the University of Nebraska's South Central Research and Extension Center.

53. EPA (R. VII)/USDA (SCS) - Task group to develop a USDA/SCS Agricultural Management Practices manual.

54. EPA (R. VII)/USDA (ARS, SCS, and ASCS) - Joint study on the relationship between agricultural practices and ground-water quality in the Big Spring Basin Clayton County, Iowa.

55. EPA (R. VII)/USDA (SCS) - Cooperative study of the impacts on agricultural drainage wells on ground-water quality in Iowa.

56. EPA (R. VII)/USGS (Kansas District Office) - Joint wellhead demonstration project.

57. EPA (OGWP - R. VIII)/DOI (BuRec - USGS) - Workgroup on the implementation of the High Plains Aquifer (Recharge) Demonstration project.

58. EPA (R. VIII)/USGS/Colorado Dept. of Health - Mapping project for applying GIS to determine the vulnerability of ground-water resources in the greater Denver area.

59. EPA (R. IX)/USGS - Supports USGS work to carry out joint hydrogeologic studies related to a Sole Source Aquifer petition.

60. EPA (R. IX)/USGS - Participation in the NAWQA Carson Basin Project.

61. EPA (R. X)/USGS (Tacoma District Office) - Will conduct a joint workshop on data management.

62. EPA (R. X)/USGS/USDA/Oregon State University/Oregon Health Division/Oregon Department of Environmental Quality - Conducting joint studies of Oregon's ground water for agricultural chemicals contamination.

63. EPA (R. X)/DOI (USGS) - EPA has contracted with USGS to prepare reports on Sole Source Aquifer Designations and is using USGS study data for development of resource decision documents.

64. EPA (R. X)/USDA (SCS & FmHA) - MOU to review Federal financially assisted projects in sole source aquifer designated areas.

65. EPA (R. X)/DOI (USGS) - Established a Region X Ground-Water Task Force which conducts workshops for joint data management.

66. EPA (R. X)/DOI (USGS, SCS, BuRec)/USDA/Indian Health Service - Representatives meet to discuss cooperative future ventures including those on ground water protection.

67. EPA (R. X)/USGS/USDA/University Oregon/Oregon Health Division - Joint studies of naturally occurring arsenic contamination in ground water.

68. EPA (R. X)/DOI (USGS) EPA contracts with USGS for sole source aquifer project reviews.

III. EMPLOYEE DETAILS

69. EPA (ORD)/USGS - Through an IAG, USGS Deputy Assistant Chief Hydrologist for Scientific Information Management is serving on a detail with EPA to help plan and manage EPA ground-water research programs. He coordinates USGS/EPA research programs and helps improve technology transfers between agencies.

70. EPA (R. I)/USDA (Soil Conservation Service) - Staff detailed to EPA in Nonpoint Source Program.

71. EPA (R. II)/DOI (USGS)(New Jersey District) - Staff detailed to EPA Superfund as liaison between Regions II and III, USGS District Offices and to provide technical assistance and data management.

72. EPA (R. IV)/USDA (SCS) - Staff detailed to EPA's Non-Point source program.

73. EPA (R. VI)/USDA (SCS) - Staff detailed to the Water Quality Branch for 2 years.

74. EPA (R. VII)/USDA (SCS) - Staff detailed to Nonpoint Source Program.

75. EPA (R. VIII)/USGS (Col. District) - Staff detailed to EPA's ground-water office to conduct wellfield/wellhead delineations.

76. EPA (R. IX)/USGS (Regional Office) - Staff detailed to EPA's regional office to provide technical assistance on both surface and ground water.

77. EPA (R. X)/USGS (Tacoma District Office) - USGS representative participates regularly in Region X Ground-Water Task Force meetings and undertakes committee assignments.

Abbreviations List

EPA - Environmental Protection Agency

OW - Office of Water

OGWP - Office of Ground-Water Protection

OWRS - Office of Water Regulations and Standards

ODW - Office of Drinking Water

OSWER - Office of Solid Waste and Emergency Response

ORD - Office of Research and Development

OA - Office of Administration

DOI - Department of Interior

BLM - Bureau of Land Management

BUREC - Bureau of Reclamation

BOM - Bureau of Mines

USGS - United States Geological Survey

USDA - United States Department of Agriculture

ARS - Agricultural Research Service

ASCS - Agricultural Soil Conservation Service

CRP - Conservation Reserve Program

FMHA - Farmers Home Administration

SCS - Soil Conservation Service

OTHER

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

CWA - Clean Water Act

DOE - Department of Energy

FLORIDA DER - Florida Department of Environmental Resources

GIS - Geographic Information System

IAG - Interagency Agreements

MOU - Memorandum of Understanding

R - Regions

SARA - Superfund Amendment and Reauthorization Act of 1986

STORET - Storage and Retrieval EPA System

ANSWERS TO QUESTIONS FROM CHAIRMAN SASSER

Question 1

The Environmental Protection Agency (EPA) has testified against several proposed ground water bills before both House and Senate Committees within the last eight years. Please list the bills, by number, that the E.P.A. has testified in opposition to, and the reasons for that opposition.

Answer 1

On February 23, 1988, Administrator Lee Thomas, testifying before the Senate Environment and Public Works Committee, explained that EPA's Ground-Water Protection Strategy is based upon four principles: (1) the States should continue to have the primary role in the management of the quality of the ground-water resource; (2) the Federal government has an appropriate role in controlling the use of certain toxic chemicals of national concern, in setting protective standards for major sources of contamination, in providing technical assistance, and in research and development in support of management and clean up activities; (3) a differential protection policy which considers the use, value and vulnerability of the ground-water resource should guide decisions in the Agency about how to manage the resource; and (4) distinguishing between prevention and corrective action in our decision making and putting more emphasis on prevention of unacceptable contamination is the direction toward which the Agency should move. He also emphasized that the Agency's main challenges in ground-water protection are to further build State capacities to protect their ground-water quality and to further the differential protection policy and a consistent administrative approach across EPA's programs.

Because the legislative proposals over the past two years would hinder EPA's ability to meet the goals of the Strategy, and in some cases constrain EPA's ability to carry out existing statutory missions, EPA and the Administration have opposed them. These proposals include: Senate bills 20, 1105, 1419, 1992, 513, 2091, and 2092 and the ground-water provisions of 1516; and House bills 791, 2253, 963, 2320 and the ground-water provisions of 2463.

Bills which were introduced and considered prior to the 100th Congress, have not been included since those bills are not being considered for action by this Congress.

Question 2

If the Administrator has testified against all proposed ground-water legislation, why is this so, given the continuing pollution of our ground water, the testimony of environmental and industry witnesses about the need for a more streamlined ground-water policy, and the fact that several congressional committees, after extensive hearings, have recommended new, more forceful, and more coordinated approached to ground-water management and protection?

Answer 2

As noted in our Answer to question 1, the proposed ground-water legislation in the 100th Congress would be inconsistent with EPA's efforts to implement its current statutes and its Ground-Water Protection Strategy. The Agency, in concert with the other Departments, is supporting several effective and coordinated ground-water protection activities. Each bill being considered would hinder or prohibit EPA from successfully implementing the Strategy and principles discussed in the answer to question 1 or would create new committees or organizational structures which could seriously impede the efforts of EPA and the other federal agencies to achieve the statutory missions mandated by Congress in existing federal environmental laws.

Question 3

In your testimony you indicated that the EPA has the appropriate authority to deal with the various ground-water pollution problems that it faces. However, every other outside witness, whether from industry or from environmental groups, has indicated that the Subcommittee's legislation, S. 1992, is a step in the right direction. They see it as a vehicle that will bring agency heads together and make them iron out pressing ground water problems. Why, in light of the backing of these diverse interest groups, is the EPA opposed to this legislation?

Answer 3

As noted in our testimony, the Interagency and Advisory Committees which would be created by S. 1992 could hamper EPA's and the other federal agencies' implementation of their current statutory responsibilities. There are many interagency coordination activities outlined in EPA's testimony and in the attached Appendix, each designed to enhance each agency's statutory missions and each appropriately tailored to address either specific or broader issues (see also the answer to Question 10). Thus, the S. 1992 Interagency and Advisory Committees could duplicate and impede current efforts by providing an unnecessary additional layer of intra-governmental review.

Industry and environmental groups each have their own special reasons for supporting such legislation. However, these groups are not familiar with the government management organizational concerns which cause the Administration to oppose this bill.

Question 4

The American Mining Congress cited one severe example of regulatory overlap causing duplication of effort and confusion with regard to the clean up of uranium mill tailings sites. The Nuclear Regulatory Commission has authority to regulate clean up of ground water at active sites, and the Department of Energy has similar authority over clean up at inactive sites. Sometimes, I understand, the line of demarcation between one agency's jurisdiction and another's is the fence surrounding the site. The EPA sets different ground-water protection standards at active and inactive sites and it has been determined that clean-up regulations by the EPA, the Nuclear Regulatory Commission, and the Department of Energy are all in conflict with one another.

Quite frankly, this conflict only invites delay and inaction with regard to ground water clean-up. This is a conflict that is not being resolved. Wouldn't an interagency committee directly answerable to the President be able to cut through this conflict and get consistent clean up efforts underway?

Answer 4

EPA believes there is no overlap or conflict regarding regulatory standards for ground water cleanup at uranium mill tailings sites. The statutory matrix applicable to uranium mill tailings sites is admittedly rather complex, but in EPA's view the issues involving ground-water standards should no longer be confusing.

The Uranium Mill Tailing Radiation Control Act requires EPA to establish standards for the protection of the public health, safety, and the environment from radiological and nonradiological hazards associated with uranium mill tailings. EPA has established ground-water standards for active (NRC-licensed) sites, and has proposed ground-water standards for the inactive mill sites, as discussed below.

DOE is currently remediating ground-water quality on the inactive sites and continuing several ground-water quality studies in anticipation of meeting EPA ground-water standards. By statute, DOE must obtain NRC concurrence in its ground-water remediation activities.

NRC continues to regulate the licensed (active) sites, as it did prior to UMTRCA. NRC has modified most of its regulation to conform to the EPA standards.

Understanding the point about consistency between ground-water standards at active and inactive sites requires a brief review of the history of these two standards. On October 7, 1983 EPA published quantitative standards for ground-water protection at the licensed (active) UMT sites (48 FR 45926). These standards withstood all legal challenges and remain in effect.

On January 5, 1983, EPA established qualitative standards for the inactive UMT sites but did not establish ground-water standards. These standards were upheld in part and remanded in part to EPA on September 3, 1985 by the Tenth Circuit Court of Appeals. The Court held that EPA should have set ground-water standards and admonished EPA "...to treat these chemicals that pose a ground-water risk as it did in the active mill site regulations".

In response to the Court's direction EPA proposed ground-water standards for inactive sites on September 24, 1987. With two exceptions, the proposed standards are similar to the existing standards for licensed UMT sites. The exceptions are that concentration limits are proposed for uranium and molybdenum and guidance is proposed for determining when ground-water cleanup may not be required. The latter exception, if ultimately promulgated, might have implications for the licensed sites that could lead to new rulemaking for licensed sites.

EPA is required by the Uranium Mill Tailing Radiation Control Act (UMTRCA) to establish standards that are consistent with requirements or standards under the Solid Waste Disposal Act, as amended. These SWDA rules take several forms including technology requirements (liners and leachate collection systems beneath waste impoundments) and identification of the point of compliance (in the uppermost aquifer at the edge of the waste impoundment). EPA adopted these SWDA rules for the licensed UMT sites. Traditionally, NRC has established rules for on-site activities under the Atomic Energy Act, and EPA has established generally applicable standards that apply off-site for off-site protection of public health and the environment. The UMTRCA modified this tradition with respect to uranium mill tailings by permitting such rules to apply on-site. The 10th Circuit dismissed challenges based on the argument that EPA lacked authority to issue the standards promulgated, agreeing with EPA that the rules were generally applicable (they apply uniformly to all sites), and thus did not infringe on NRC's regulatory authority.

Question 5

The testimony before the Subcommittee indicates that serious ground water problems exist in this country. Let's note just one for the record. It is reported that in Iowa state officials have estimated that as many as half of the state's water supply systems may be contaminated with pesticides or other organic contaminants. Iowa is a major producer of agricultural products. It is probable that a considerable amount of the state's ground water contamination came from farming practices.

In a case like this, shouldn't the EPA mount a crash program with the Department of Agriculture and take immediate steps with state and local officials in Iowa to reduce ground-water pollution? Has this been done? Wouldn't a coordinating council along the lines of that proposed by S. 1992 help initiate desperately needed programs to address emergency situations such as those described in Iowa?

Answer 5

To our knowledge, the levels of ground-water contamination caused by agricultural chemicals do not constitute an "emergency" in Iowa or in any other State. There are a number of site specific problems which have developed over a long period of time which federal agencies and the States are now addressing. However, no wide-spread ground-water contamination crisis exists now and none is expected in the foreseeable future. Increased efforts by EPA, together with the Department of Agriculture and State agencies, to focus on prevention of unacceptable contamination will assure that a crisis does not occur. The National Governor's Association and the Conservation Foundation are among the groups that share this assessment of current ground-water quality.

EPA assisted Iowa directly through the Clean Water Act Section 106 grants program to move forward in its protection efforts. The State developed a ground-water protection strategy using this EPA funding and that strategy formed the basis of the 1985 "Iowa Ground-Water Protection Act" which is a major State statute addressing the State's ground-water problems.

EPA has also greatly increased its efforts to address the growing concern about pesticides in ground water. We are conducting a national survey of pesticides in water wells and we have published the proposed Agricultural Chemicals in Ground-Water Strategy for public comment. In addition, the Agency has incorporated new requirements under FIFRA registration of pesticides to minimize adverse impacts from the use of certain chemicals that have a potential to leach into the ground water. The goal of the Agricultural Chemicals in Ground-Water Strategy is to protect the ground-water resource, with a focus on preventing unacceptable contamination. The Strategy recognizes that a strong lead State management role is the preferred approach, since ground-water contamination is a localized problem due to variations in things such as hydrogeology and farming practices.

As I am sure you are aware, the Department of Agriculture is quite concerned about the impacts of agricultural and silvacultural activities on ground-water resources. As mentioned in our testimony before the Subcommittee, USDA and EPA coordinate ground-water protection efforts between the two Agencies and among the other federal agencies and the States. In addition, Administrator Lee Thomas has directed EPA;s Regional

Administrators to assure that good communication channels exist between regional EPA offices and State agriculture and health officials. Given all of these activities, we do not think legislation to require additional formal coordination mechanisms is necessary.

Question 6

In a February 24, 1987 New York Times article, the Administrator of the EPA, Lee Thomas, stated that Congress should revamp the national ground-water protection program. Why then hasn't Mr. Thomas taken the step of meeting with all the sections within his own agency and setting up a comprehensive coordination mechanism?

Answer 6

Over the past four years, Administrator Lee Thomas has taken the initiative to implement the 1984 Ground-Water Protection Strategy thereby spawning extensive efforts to coordinate and increase consistency among EPA's programs regarding ground-water protection. To name just a few:

- the Agriculture Chemicals in Ground-Water Strategy which provides a coordinated EPA approach to preventing unreasonable contamination of ground water by pesticides;
- the Interoffice Ground-Water Policy Committee, which is a senior staff group representing each Assistant Administrator and which meets periodically to review major ground-water policy issues;
- the Interoffice Data Management Committee, which coordinates EPA's efforts to develop consistent, reliable and usable data on ground-water contamination and on protection efforts;
- the Ground Water Classification Guidelines, which provide a framework for ground-water decision making and implements the differential protection policy in the Agency; and,

- the establishment of EPA's Office of Ground-Water Protection (OGWP), which has major ground-water protection coordination responsibilities. OGWP coordinates EPA's ground-water issues throughout Headquarters and via representatives in the EPA Regional Offices.

These are only several examples of interoffice coordination; in addition, day-to-day coordination activities occur between individual staff, group briefings, and regulatory work groups, as well as other policy and implementation work groups. Consequently, EPA has taken significant actions to coordinate ground-water protection efforts.

Question 7

Isn't it true that when the Reagan Administration came into office, that it made huge cuts in the funding in the EPA's public information dissemination budget? Don't you think this cut is terribly cost-ineffective considering that preventing ground water pollution is so much easier and cheaper than cleaning it up?

Answer 7

It is true that there were reductions made in EPA's public information programs in the early 1980's. These reductions were part of the Administration's efforts to reduce spending by discretionary programs.

During the last several years, however, EPA has taken action to rebuild and strengthen our public information dissemination programs. We agree that such programs can provide a very cost-effective means of fostering environmental protection and reducing pollution in many instances.

Question 8

Would you describe the results of the meetings of the Office of Management and Budget task force on ground water? For example, what decisions were made, what specific changes were made to better coordinate the various ground water management programs? What was the nature of the Office of Management and Budget's participation in this task force?

Answer 8

The OMB established and chaired the Task Force to develop an Administration position on national ground-water legislation being considered by the Congress, focusing primarily on research issues because they were the issues principally involved in the bills which the Congress was considering most actively. The Task Force achieved its goals. An Administration position was reached on research legislation best exemplified by a Statement of Administration Policy transmitted to the House of Representatives concerning H.R. 791. To support this position, the Administration completed a paper describing "FY 1987 Federal Scientific and Technical Ground-Water Programs" which was sent to all members of the House and Senate.

Coordination of scientific and technical programs across the federal agencies was also a significant item of discussion in the committee and the result was the new Subcommittee on Ground Water of the Committee on Earth Sciences of the Federal Coordinating Committee on Science, Engineering, and Technology (FCCSET). FCCSET is an interagency committee reporting to the Office of Science and Technology Policy in the Executive Office of the President. This FCCSET Subcommittee includes high-level technical representatives of all federal agencies involved in ground-water research and technology and will be the vehicle for coordinating scientific and technical issues of common interest.

Question 9

In a highly complex and technical area like ground-water protection and management, do you think that it is appropriate for the Office of Management and Budget to chair a ground-water task force? If so, why?

Answer 9

The OMB is appropriate to chair an Interagency Task Force on ground-water issues because it is the Administration's focal point for developing policy for the President on legislation affecting more than one agency, as is the case with ground-water research legislation. In addition, decisions relating to inter-Agency management are one of the primary responsibilities of OMB. Such decisions do not require that OMB staff possess detailed knowledge of the more highly technical aspects of each Agency's specific activities. Agencies with such technical responsibilities sit on OMB task forces and are fully capable of representing complex, technical issues during the decision-making process.

Question 10

Why do you have several different task forces to coordinate ground water and so many (over 70) separate memoranda of understanding with various agencies, rather than an omnibus task force memorandum? Do you think this splintering of oversight roles is really efficient or effective? How do these task forces communicate with each other? Will we ever get a national ground water policy at the rate you are working? Isn't this issue important enough to focus on and develop a coherent strategy?

Answer 10

As noted in our testimony and in the answers to several questions above, coordination of ground-water policies across federal agencies can only be effective if those coordination mechanisms enhance each agency's ability to achieve its statutory missions. The numerous task forces and interagency agreements, are each designed to further the statutory missions of the agencies. These coordination mechanisms, therefore, are not oversight groups, but rather are facilitating mechanisms.

EPA has memoranda of understanding (MOUs) with each federal agency involved in ground-water issues. We generally have a generic MOU with other agencies to define the scope of interaction, but may add specific MOUs on particular issues, e.g., generic MOU with USGS (#1 on list in the Appendix in the testimony) and ground-water MOU (#2 in the Appendix). In addition we will negotiate specific agreements where a major effort is involved, e.g., joint mapping workshop (#14 in the Appendix).

In addition, we have numerous standing committees for topics of long term interest between agencies such as the Interagency

Advisory Committee on Water data which works on such issues as quality assurance of ground-water data, data integrity, Geographic Information Systems, and an interagency ground-water glossary.

The Administration, therefore, has been developing over the last eight years better coordination mechanisms, while each agency develops ground-water policies which achieve their statutory missions. For example, EPA, as stated, developed its Ground-Water Protection Strategy in 1984, but all Departments had the opportunity to review and comment upon it before its adoption through OMB's review processes. Currently, other departments are moving forward to develop ground-water strategies. All the while, coordinating mechanisms are utilized among agencies to enhance achievement of statutory missions.

Question 11

Has the 1984 Memorandum of Understanding with USGS ever been updated or amended? How do you justify this is light of the fact that our understanding of ground-water problems has increased so significantly in the last four years?

Answer 11

The 1984 Memorandum of Understanding (MOU) with USGS is an "umbrella-type" MOU that provides a forum for discussion of any number of issues of joint concern to EPA and USGS. As a forum to discuss issues of mutual concern, the 1984 MOU does not stand in the way of any specific EPA/USGS groundwater MOU from being developed, if the agencies wish to do so. In fact, there is a DOI-EPA MOU on ground-water protection which defines agency roles and relationships in research, monitoring, and data management--the three functional areas where the two agencies have common interests and interrelated missions. That MOU was signed in June, 1985.

Question 12

Is the EPA's ground water strategy an effective document? If you think it is, why do you think so when everyone else (industry, agriculture, and environmental groups) disagrees with you?

Answer 12

As we noted in our testimony, EPA's Ground-Water Protection Strategy was adopted in 1984. In developing the strategy over the 1980-1984 period, there was extensive and intensive input from industry, agricultural interests including farmers, and environmental groups, as well as from other federal agencies, Congress and State and local governments. All were very supportive of the process and all encouraged us to move forward. In addition, publication of the strategy was well received by all of the groups. From EPA's perspective, the Strategy has been effective in doing what it set out to do.

Question 13

I understand there is some conflict within the federal government about the ability of the EPA to enforce environmental standards on federally-owned land. This is of particular interest to the people of Tennessee in the context of the Department of Energy's Oak Ridge National Laboratory facility. As you know, there was some litigation over this issue by Tennesseans against the Department of Energy to force them to apply certain standards to their releases of contaminants.

I understand that this problem is further complicated by the fact that four different agencies are directly concerned with the release of radioactive contaminants: the Environmental Protection Agency, the Nuclear Regulatory Commission, the Department of Energy, and the Department of Defense. What are you doing to resolve this sort of problem?

Answer 13

In June of last year the Assistant Administrator for Solid Waste and Emergency Response created the Federal Facilities Compliance Task Force to serve as a focal point to resolve Federal facility compliance problems and issues in the hazardous waste program. The Task Force has been working with other EPA offices, the EPA regions, and the States to bring Federal facilities into compliance with EPA regulations and to clean up past contamination problems. The organization which started out as a Task Force is now an EPA office, thereby demonstrating EPA's commitment to resolving these issues.

In January of this year EPA issued guidance on enforcement actions at Federal facilities under the hazardous waste statutes. This guidance, approved by the Justice Department, describes the different authorities and actions EPA may undertake to bring facilities into compliance. In March, the EPA issued additional guidance to the Regional offices setting out negotiation timeframes and an evaluation process to quickly resolve disputes between agencies over compliance matters.

Finally, and perhaps most significantly, the EPA reached agreement with the Department of Energy (DOE) in late May and the Department of Defense (DoD) in June on model language to be used in CERCLA Section 120 Agreements. The agreements reflect the commitment of Federal agencies, in this case DOE and DoD, to work with EPA to clean up significant releases of pollution at its facilities. The agreements and commitments of the parties are fully binding and enforceable by States and citizens. Other key provisions agreed to are: a mechanism to resolve disputes, with the EPA Administrator making the final decision; stipulated penalties for violations of the agreement; funding of the commitments; and a process for the review and approval of the work carried out under the agreement.

The model language agreed to by DOE, DoD, and EPA will accelerate site specific study and clean up agreements. The three agencies are committed to work with the individual States where these facilities are located to factor in their interests and concerns.

With regard to the four agencies' responsibilities on release of radioactive contaminants, we understand that DOE has revised its internal orders and NRC its regulations to be consistent with EPA's regulations.

Question 14

Did the Office of Management and Budget review May 18 Subcommittee testimony? Didn't they in fact cause such a delay that your testimony was submitted late--even though you requested a delay of one month, after your testimony had been virtually completed inside the agency? What changes did the Office of Management and Budget make to your testimony during this time-consuming review?

Answer 14

EPA was aware for quite some time before the hearing, of the Subcommittee's intention to hold a hearing on S.1992. In fact, the hearing was originally scheduled for March 25, was postponed until April 22, and was finally held on May 18. However, EPA did not receive--until May 3--a copy of the official letter of invitation, containing five specific questions which the Subcommittee wanted answered. Thus, EPA could not complete the testimony inside the Agency until it was re-drafted to answer the Subcommittee's exact questions.

EPA testimony was forwarded to OMB for clearance on May 11. It was circulated to other agencies for comment and then cleared by OMB on May 17. The changes which OMB made were not extensive in nature.

Question 15

What is the Ground Water Office's communication strategy to the states and to the public? What outreach efforts has your office undertaken?

Answer 15

One of the major goals of the Office of Ground-Water Protection (OGWP) has been to increase the States' capacities to take the leadership role in ground-water protection. To do this, we have provided about $27 million over the last 4 years to the States to develop State strategies, produced and distributed to State and local government over 25 technical assistance documents and materials, made hundreds of presentations to State, Indian tribes, local groups, and policy/program individuals, and sought State/local and tribal input in numerous formal and informal forums.

The Office's communication strategy is designed to assure that the States, local government, federal agencies, Congress, the private sector and individual citizens receive the best information available on the extent of ground-water problems and the best policy, management, and technical methods for solving those problems. We have published various technical assistance documents such as (see attached publications list for others):

* "Improved Protection Of Water Resources From Long-Term and Cumulative Pollution: Prevention Of Ground-Water Contamination in the United States; 1987", which was principally directed to the OECD.

- "Protecting Ground Water: Pesticides and Agricultural Practices, 1988".
- "Ground-Water Data Management with STORET, 1986".
- "Ground-Water Monitoring Strategy, 1985".

In addition, we have provided information for numerous journals and publications about these documents and about the Office of Ground-Water Protection's efforts to assist States with developing ground-water protection strategies and with implementing Wellhead Protection programs.

To assist States with this latter program and to inform the public of our efforts, we have published several public documents explaining, in part, the Wellhead Protection Program in the Safe Drinking Water Act. In addition, we have provided extensive training of federal, State, local and private officials on the Act's provisions regarding wellhead protection, and distributed numerous technical assistance guides. This year we are continuing our efforts to communicate information on our efforts in wellhead protection by increasing the number of technical assistance documents, providing extensive new training sessions and by holding a Wellhead Protection Conference, primarily for State and local participants, but also for anyone in the private sector or general public.

Some of the technical assistance efforts in Wellhead Protection include:

- Guidelines for Wellhead Protection Area Delineation.
- Wellhead Protection Area Management

- Management of Sources of Contamination in Wellhead Protection Areas. (going to print)
- Contingency Planning for Public Water Supplies. (being developed)
- Financing Options for Wellhead Protection Programs.

Further, EPA's regional Ground-Water Representatives work closely with each State to assist them in coordinating and integrating ground-water protection activities within their institutions and into their environmental planning and decision making. These regional efforts are an integral part of EPA's communication strategy to the States and to the public.

Question 16

In your testimony, you mentioned the hydrogeologic mapping workshop that took place in Denver in May. We have heard from attendees that while appreciated, this workshop took a long time in coming, and indeed was the first such joint USGS-EPA effort to consult with the states and localities about their mapping needs. Please explain the length of time it took to prepare the event and the reasons for delay, if any.

Answer 16

EPA and the United States Geological Survey (USGS) hosted this cooperative event which received very positive reviews from all State and local attendees. This is just one of many coordination efforts over the past 4 years as EPA continues its efforts to implement the Ground-Water Protection Strategy. A conference such as this does take time to prepare in order to be successful; however, the preparation time for this Workshop is no different than any other conference, seminar, or training class sponsored by EPA alone or in coordination with other agencies for State and local officials. There were no delays affecting presentation of the seminar.

Question 17

I understand that the Committee on Earth Science did not actually establish the Subcommittee on Ground Water until December, and that its charter is still in draft form. This Subcommittee was apparently to have begun meeting in January in this year. There is no indication as to whether it has formally done so, or as to whether its charter has been finalized. Please indicate the status of the charter, the number of meetings held, and the attendees of the meeting. Your agency has representatives to this Subcommittee. Aren't your representatives primarily research--not policy--staff? What progress have they reported to you of this Subcommittee?

What role do agency heads play in this Subcommittee? Do your representatives at least report to Lee Thomas about activities conducted? Should agency heads have a more active role? After all, they are the ones responsible for policy.

Answer 17

The charter for the Subcommittee on Ground Water (SCGW) was approved in April by the Committee on Earth Sciences. The essential feature of the Charter is that the scope of the Committee's activities will be scientific and technical, which is the appropriate scope for such an interagency committee.

To develop this charter, as well as to make progress on a workplan, the SCGW met on February 23, March 18, and April 21 of this year. The most recent meeting was on June 23 which was the first working meeting under the new charter. Significant progress was made in developing a workplan and in developing the scope and substance of the subcommittee's first report to the Committee on Earth Sciences as required by the Charter.

The EPA representatives on the SCGW are Dr. John Skinner, Director of the Office of Environmental Engineering and Technology Demonstration, and his Deputy Director, Dr. Fred

Lindsey. These are appropriate representatives given the Subcommittee's Charter. While Dr. Skinner and Dr. Lindsey are the official representatives, they clearly inform Dr. Vaun Newill, the Assistant Administrator for Research and Development, on the Subcommittee's agenda and activities, and Dr. Vaun Newill, in turn, informs the Administrator. Dr. Skinner and Dr. Lindsey also inform the relevant Agency policy officials on the nature and progress of the SCGW.

Question 18

There is mention of "observers" in the draft charter of this Subcommittee on Ground Water but no representatives of state and local interests to the body are apparent. How does the Subcommittee intend to disseminate its findings to the states, and to the public, for that matter? And how will it in turn be apprised of state and local groundwater needs?

Answer 18

The report that the Subcommittee on Ground Water is presently developing (referred to in the answer to question 17) will be submitted to the Committee on Earth Sciences. Distribution of the report will be made to all State ground-water program officers, universities, research centers, professional associations, and to the interested public. Notice of the availability of the report will be widely disseminated through normal technology transfer routes. State review of the report will be sought and their needs will be solicited through use of a representative group of State ground-water program heads.

Question 19

How is it that you maintain that you are not aware of duplication or overlap and yet, in a September 30, 1987 memo by the President's Science Advisor, he writes that, "these agencies presently coordinate their ground water programs through bilateral committees and memorandums of agreements, but have identified deficiencies with this arrangement". Please comment on what coordination deficiencies the task force identified. These were, after all, apparently what led to the creation of the Subcommittee on Ground Water under "FCCSET".

Answer 19

We think our coordination efforts have been successful and we are not aware of any unnecessary duplication. The subcommittee on Ground Water was created for the purpose of assisting federal agencies as well as State and local governments achieve their policy missions through better science and technical know-how. The Subcommittee is looking to the future for the purpose of assuring that the best scientific information will be available to support policy development and ground-water management decisions.

Question 20

If there is indeed no unnecessary duplication or overlap, why does Point B of the draft charter of the "FCCSET" Ground Water Subcommittee state that it shall "Help ensure that these programs are complementary and not unnecessarily duplicative?"

Answer 20

The Subcommittee on Ground Water charter contains a number of broad goals. Point B of the charter simply acknowledges an ever-present concern that federal agencies continue to guard against unnecessary duplication or overlap. There is always the potential for some duplication if agencies do not coordinate their research agendas. The SCGW committee's duties will include determining whether any duplication which does exist is unnecessary, and minimizing any unnecessary duplication which is discovered.

Question 21

The Interagency Committee in S. 1992 is designed to do the following:

Review the activities of each member agency to ensure coordination;

Identify and eliminate duplications and overlap among programs of member agencies;

Identify major state technical assistance, information, and research needs;

Develop overall priorities and a coordinated plan for addressing state technical assistance, information, and research needs;

Review ground water information and data collected by member agencies and make recommendations to maximize the value of information collected for programs conducted at the federal, state, and local levels;

Facilitate interagency communication on technical assistance, information, and research and development programs which support state ground-water protection and management programs.

Can a single Ground Water Subcommittee, with research staff and not agency heads and members, accomplish these goals?

Answer 21

As noted in our previous answers, we oppose S. 1992 primarily because the interagency committee proposed in the bill is unnecessary and will not accomplish the goals listed. Rather, the proposed committee is likely to force the federal agencies to duplicate their already effective cooperative efforts by adding unnecessary layers of review of agency's polices and activities.

Question 22

Four separate EPA offices set four separate standards for ground water contaminants. Is this consistent with the 1984 ground water strategy?

Are there plans to make the 1984 EPA ground water strategy a national strategy? Did you ever raise this point when the Office of Management and Budget Task Force met? How about at "FCCSET" Subcommittee meetings?

But no actual strategy has ever been formally adopted, government-wide?

Lee Thomas has recently been mentioning maximum contaminant level standards, or "MCL's", quite frequently. Has the Agency reached a consensus on the MCL or set any sort of deadline on setting a uniform ground water protection standard?

Answer 22

Administrator Lee Thomas has articulated clearly an Agency goal to make the ground-water administrative approach more consistent across EPA's programs to the extent allowed by relevant statutes. The Agency, therefore, has moved forward with implementation of the Ground-Water Protection Strategy, which, in part, is designed to foster a greater degree of consistency. A major part of the effort to increase consistency has been the achievement of agreements among the Agency's operating offices to implement EPA's differential protection policy and to establish consistent reference points for decision-making regarding prevention and clean up actions. This reference point for a particular contaminant is the maximum contaminant level (MCL) when an MCL has been established. Offices will have the ability to deviate from the basic reference point for protection and cleanup activities in carefully defined cases. These policies are consistent with the 1984 Ground-Water Protection Strategy.

There are no plans to make the EPA Ground-Water Protection Strategy government-wide. While many issues related to the strategy were discussed at the OMB Task Force meetings, there was no discussion of whether the EPA strategy should be a government-wide policy. At the FCCSET Subcommittee meetings, these issues do not and should not arise since the Subcommittee is designed to address scientific and technical issues.

EPA's strategy provides a vehicle for achieving the statutory missions assigned to EPA. Other strategies may be more appropriate for other Agencies with other statutory responsibilities. Thus, EPA's strategy may not be appropriate in its entirety for other federal agencies.

Testimony of
Philip Cohen
Chief Hydrologist, Geological Survey
U.S. Department of the Interior
before the
Senate Committee on Governmental Affairs
Subcommittee on Governmental Efficiency, Federalism, and the District of Columbia

May 18, 1988

Opening Remarks

Chairman Sasser and Senator Heinz, members of the Committee, it is a pleasure for me to appear before you today representing the Department of the Interior and the U. S. Geological Survey (USGS) to discuss S.1992, a bill to promote intergovernmental and interagency cooperation in the development of ground-water policy. The USGS has the largest ground-water research program within the Federal Government today, and so the provisions of S.1992 are of great interest to us.

Because of our interest in the Nation's ground-water related programs, we have given a good deal of thought to the underlying principles that should guide Federal ground-water activities. I would like to outline briefly what we see as an appropriate role for the Federal Government in ground-water. I would also like to provide you with our answers to the specific questions you posed for our consideration and response.

First and foremost, we believe the Federal Government should recognize that the primary responsibility for ground-water protection and management lies with State and local governments. This is based on both philosophical and practical considerations. State and local governments have always held the responsibility of managing ground-water resources for the residents of their communities. The Federal Government should not interject itself into that process beyond what present statutes require or clear and overriding national needs dictate. Even more basic to this concept is the fact that many of the current means of protecting ground water involve land-use controls, a role which has traditionally been vested in State and local government.

In our view, the Federal mission should be to carry out the provisions of Federal statutes that relate to ground water; conduct research; conduct resource assessments; provide data and information; and provide technical assistance, training, and education for State and local governments to use in managing ground-water resources and in carrying out the provisions of Federal statutes which delegate responsibilities to them. The long-range goal of Federal scientific programs related to ground-water quality should be to develop a greater understanding of the Nation's ground-water resources and to provide the needed technical information and capabilities to help State and local governments manage both the quantity and quality of their ground water.

In providing the necessary funding to carry out such a program, we should also continue to rely on joint funding agreements among Federal, State, and local governments. Our experience with joint funding, through our Federal-State Cooperative Program, has demonstrated that such agreements encourage effective transfer of scientific knowledge and data, provide consistent data upon which to base national ground-water policy, and maintain a spirit of Federal-State partnership related to environmental issues.

The USGS has played the leading role in providing information about the Nation's water resources for the last 100 years. We believe that the USGS has a great deal to offer in helping the Nation achieve the goals I have outlined. Its capabilities in research, data collection, resource assessment, technical assistance, and information dissemination are assets which should continue to be utilized fully as the Nation seeks to improve the management and protection of its ground-water resources.

Regarding the coordination of scientific and technical programs, I would like to take a moment to describe just a few examples of the many coordinated ground-water programs in which the USGS already participates.

One example is an event that took place only last week. The USGS, in partnership with the Environmental Protection Agency's (EPA) Office of Ground Water Protection, conducted a 3 day workshop on hydrogeologic mapping. This workshop is part of an ongoing process between our two agencies "to determine the need for specialized and more consistent hydrogeologic maps for use in protecting and managing ground-water quality, especially at the State level." The workshop was attended by over 75 people, many of whom are State or local officials responsible for ground-water protection programs. The meeting provided an excellent forum for the users of such maps to communicate with those who make the maps (USGS and others in the geologic community).

A second example is the assignment of hydrogeologists from the USGS to EPA regional offices or headquarters. At the moment five such assignments have been made. These assignments provide excellent vehicles for helping EPA to gain access to USGS's expertise in hydrogeology and helping the USGS gain a better understanding of the scientific information needed to carry out the provisions of various ground-water statutes. In addition, both the USGS and EPA have a variety of task forces and committees providing guidance to the respective agencies on matters related to ground water with a great deal of participation by USGS on EPA's committees and by EPA on the USGS committees.

The USGS and EPA have a Memorandum of Understanding related to ground water which clearly defines the roles of the two agencies and describes many of our interrelationships and mutual obligations. Similarly, the USGS and The Department of Agriculture have a Memorandum of Understanding related to research on agricultural sources of ground-water contamination. There are numerous research sites at which we carry out coordinated research studies with scientists from these agencies. These include major USGS studies in Cape Cod, southwest Georgia, a large portion of the midwestern corn and soybean growing area, the Delmarva Peninsula, Central Oklahoma, and the Carson Basin of Nevada. These studies are enhanced by the interaction of the scientists from the different agencies, each with different research goals related to some aspect of the fate and transport of contaminants in the subsurface. There are also cost savings which result from such collaboration because multiple investigators can often use the same wells or the same chemical analyses.

The coordination of research, information, and technology development related to ground water is clearly vital to the rapid and cost-effective achievement of the Nation's desire for clean ground water. The Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) Committee on Earth Sciences was created with consultation among participating agencies and has taken steps to promote such coordination through the creation of a subcommittee on ground water.

Although we fully agree that coordination of Federal ground-water activities is essential, we are unable to support S.1992 for several reasons. First, it goes substantially beyond a role of coordination of research, information, and technology development into the area of coordination of all aspects of ground-water policy, management, protection, and remediation. These matters are generally set forth in statute and delegated to a single officer in the Executive Branch (such as the Secretary of Agriculture or Interior, or the Administrator of EPA). To place these responsibilities under the control of a multiagency committee would not lead to more effective management. It could, quite possibly, disrupt the progress the individual agencies can make in carrying out the their statutory responsibilities.

Second, we are also concerned that the bill would give the Interagency Committee the authority to " ... eliminate duplications and overlap between or among programs of member agencies." It is not clear how this specific duty would be accomplished, but it appears to give the committee line authority over agency programs. Such authority could conflict with existing authorities and delegations, and with the purpose and intent of the Congress and its various committees. I believe it is more appropriate for a coordinating committee to collect and exchange information, air views, and seek consensus. We do not believe, however, that there is duplication or overlap.

Third, although we agree that coordination is necessary and that many of the issues raised are very important, we don't think that legislation is necessary because the implementation of agreed upon policies can be accomplished through existing authorities and mechanisms.

Mr. Chairman, that concludes my remarks. I would be happy to answer any further questions the subcommittee might have. I also would like to submit for the record our answers to the subcommittee's formal questions:

Responses to Subcommittee Questions

1. A more comprehensive Federal ground-water protection policy and better interagency and intergovernmental coordination have often been urged; do you agree that S. 1992 addresses those needs?

In my opening remarks I indicated that I believe that coordination of scientific and technical work is very important. However, there is already a great deal of interaction and coordination occurring. I believe the institutions needed to facilitate that coordination already exist. These include many bilateral coordinating committees and the multiagency FCCSET, Committee on Earth Sciences, Subcommittee on Ground Water. As I mentioned in my opening remarks, the committee authorized by S.1992 would have a mandate so broad as to interfere with the timely execution of various statutory requirements related to ground-water protection.

2. Would comprehensive Federal groundwater protection policy and the accompanying Federal oversight and guidance dilute or reinforce existing State and local policies?

This would depend, of course, on the policies adopted. It is conceivable that S.1992 could have the effect of diluting State and local policies if it were to produce delay in the timely execution of various existing statutory requirements. However, I believe the key factors that will determine the effectiveness of any policy are related to the knowledge of the resource, knowledge about the most effective management practices and technologies, analytical tools to predict consequences of protection and remediation actions, and qualified people to carry out those policies.

3. If the primary responsibility for groundwater policy-making were to reside with the federal government, which agency(ies) should set it?

It is the view of the Administration that primacy for ground-water management should remain vested with the States. This is appropriate because the impacts of ground-water management decisions generally are localized, and only very rarely are there significant interstate impacts. Because ground-water flow rates are slower, and flow paths from recharge areas to discharge areas are generally short, it is uncommon for contaminants to move in the subsurface across State lines. Thus, arguments of interstate ground-water contamination provide little justification for direct Federal management. There are some instances where contaminated ground water from one State discharges into a river which then flows into another State; but these instances can be dealt with through traditional methods for addressing interstate surface-water issues, again without the need for direct Federal management.

With respect to scientific and technical programs related to ground water, no one agency should be empowered to control the priorities of other agencies. The designation of a single lead agency, or a pair of lead agencies, would create confusion and perhaps limit the ability of other agencies to achieve their statutorily mandated goals. There are a host of statutes that define the responsibilities of various agencies, and I believe these statutes do an adequate job in that regard.

Certainly coordination of research, development, and information programs among Federal agencies is important. The Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) committees report directly to the President's Science Advisor, and thus have a direct avenue for focusing the attention of the Executive Office of the President on important issues in science and technology. As I mentioned in my opening remarks, steps have been taken to use FCCSET to improve Federal coordination in ground water with respect to science and technology aspects. We do not believe that any free-standing committee chaired by one or two of the major agencies, as proposed in S.1992, would be equally capable of addressing and focusing attention on these issues.

In my opinion, regulatory aspects of ground water are not amenable to the use of interagency coordinating committees. Regulatory responsibilities are very specifically authorized to a named agency by statute, and these statutes generally mandate specific coordination and advisory mechanisms.

4. Cite any exemplary State, local or Federal coordinated groundwater management efforts which you are aware of that could serve as a model for any future coordinated Federal interagency entity.

We have no special knowledge to bring to this question as it relates to "policy." One source of information is the 1986 National Academy of Sciences report, "Ground Water Quality Protection: State and Local Strategies." Please note that many of the State or local programs singled out in this report as exemplary are ones that have been built on the maps, data, models, and expert advice of the USGS, provided largely through the Federal-State Cooperative Program. Examples of these include the States of Arizona, Colorado, Connecticut, Florida, and New Jersey and regional programs of Long Island, New York; Cape Cod, Massachusetts; and Dade County, Florida.

5. Cite any examples of the inefficiency or ineffectiveness of Federal and State attempts to coordinate groundwater management efforts which you are aware of that serve to illustrate the need for change along the lines envisioned by S.1992..

We are not aware of any such examples.

U.S. Department of the Interior
Geological Survey

Responses to Questions from the Hearing of May 18, 1988 before the Subcommittee on Governmental Efficiency, Federalism, and the District of Columbia United States Senate

June 23, 1988

1. **Has the U.S. Geological Survey (USGS) testified against other proposed groundwater legislation before either House or Senate Committees within the last eight years? If so, list the bill numbers and the reasons for the opposition.**

The USGS has testified consistently that ground-water legislation being considered by the Congress is not needed. This is not to say that the USGS opposes the objectives of the legislation. It means that the USGS believes that it already has the authorization needed to accomplish what is being asked of it in the new bills.

2. **The Administration, I believe, has testified against all proposed groundwater legislation, at least within the last two years. Why is this so, given the continuing pollution of our groundwater, the testimony of environmental and industry witnesses about the need for a more streamlined groundwater policy, and the fact that several congressional committees, after extensive hearings, have recommended new, more forceful, and more coordinated approaches to groundwater management and protection?**

No agency, to the knowledge of the USGS, has testified that it needs new authorization to accomplish what is being asked of it in proposed ground-water research and technology legislation. Over $215 million was spent by the Federal Government on ground-water research and technology in Fiscal Year 1987. This influenced the Interagency Task Force on Ground Water to recommend the establishment of the Subcommittee on Ground Water within the Office of the President to coordinate this sizable Federal effort, as described in the response to question 7.

The USGS supports the concept of effective interagency coordination of Federal ground-water programs. Widespread agency opposition to S.1992, and to similar coordinating provisions of other ground-water bills pending before the Congress, is based, in our opinion, on the belief that the interagency coordinating mechanisms proposed would reduce the authorities of both scientific and regulatory agencies and impede, not further, the coordination of related ground-water programs.

3. **Are the results of the studies done by the USGS in cooperation with the states coordinated with the various studies conducted by the Environmental Protection Agency (EPA) through its contractors? How is this coordination conducted? How are the results of these studies preserved and shared?**

The USGS, through its Water Resources Division District offices in each State, is in frequent contact with EPA Regional Offices. In a number of EPA Regional Offices, USGS personnel are detailed to provide liaison between USGS and EPA program activities. In some places, the USGS undertakes joint projects with EPA to support Superfund or other responsibilities of EPA. These projects usually involve the transfer of funds to the USGS to collect needed data and provide technical assistance. On virtually a daily basis, EPA contractors visit USGS District offices to obtain data or interpretive reports. The USGS also works directly with many cooperating State ground-water protection agencies in support of their regulatory activities. In addition to direct field contact, the USGS issues a Monthly List of all of its formal publications. This list is sent to EPA Headquarters and Regional Offices, as well as to thousands of other public and private institutions. A copy of every formal publication of the USGS is automatically sent to 1,700 libraries as well as to other concerned Federal agencies, including the EPA. A publications warehousing facility is maintained in Denver by the USGS. Out-of-print publications are frequently reprinted to satisfy demand and insure availability to researchers and regulators.

4. **What steps has USGS taken to make its studies practical and responsive to the needs of federal, state, and local governments? I understand that the Geological Survey does excellent work, but that it can take years to conduct one study and that the results of cooperative work with the states is often not published until years later. Therefore, crucial data is effectively not available to the public until it is out of date. For example, I understand that a study was done in Pennsylvania that was completed in 1983. It received a so-called "final review" in 1987 by the Geological Survey, and is still not published. Would you comment on this?**

The USGS publishes about 1,500 water resources reports a year, most of which are published on or about the dates originally scheduled. It is not uncommon for some complex studies to take a number of years to complete. In some cases, new data must be collected over a sufficient period to provide an adequate statistical basis to support valid scientific conclusions. But these data are available to the State or local cooperator as soon as they are verified, usually at the time of collection or within a few months after collection. In a few cases, projects may be delayed or deferred due to a lack of available manpower or financial resources either on the part of the cooperator or the USGS. The study cited in question 4 was delayed due to the reallocation of resources to higher priority activities. The report is being printed and should be distributed within the next several weeks.

One test of relevance and practical responsiveness of USGS studies to the needs of Federal, State, and local agencies is the demand from these agencies for USGS assistance. These agencies currently contribute over $50 million per year to the USGS to conduct water-resources investigations. The studies provide both immediate and long-term benefits. The immediate benefit accrues to the cooperator who is involved in the design of the project; who is given immediate access to all data collected, progress reports, and preliminary results; and who is directly involved in the technical review of the final report. This immediate benefit involves improving the understanding of regional water resources issues and conditions. The long-term benefit accrues from the final report as a contribution to the science of hydrology after publication by the USGS and dissemination to hundreds of State and university libraries and to interested scientists and engineers in both the public and private sectors. In fact, the national transfer value of the USGS's formal publications is a major benefit of Federal involvement in jointly funded projects with State and local governments. All publications undergo thorough quality assurance, peer review, and technical editing; and are frequently cited in current research reports for many years after their initial publication. The formal release of scientific findings of the USGS is carefully controlled to avoid giving unfair advantage to a particular party, because resource economic issues are often involved.

5. Have you done any studies on the cost-effectiveness of your data bases in terms of the amount of research dollars spent versus the number of responses to inquiries from a given state? Don't you think this sort of practical review of the services you offer is important?

USGS data collection programs undergo a constant test of relevance by 950 State and local cooperators and other Federal agencies with whom the USGS renegotiates jointly funded programs on an annual basis. In addition, USGS data collection efforts are closely scrutinized by both Federal and non-Federal participants in the governmentwide water data coordinating process authorized under OMB Circular A-67 and managed by the USGS (see response to question 9).

The USGS maintains a continuous program which involves discussions with other Federal agencies and State and local cooperators to evaluate the adequacy, efficiency, and effectiveness of its national surface- and ground-water quantity and quality data networks. These networks have evolved over the 109-year history of the USGS to support national, regional, State, and local studies. The multipurpose hydrologic data collected, stored, and disseminated by the USGS are essential ingredients in all field research projects. These research projects and technical assistance efforts can be undertaken only if data exist to support them.

Furthermore, most hydrologic data, to have value, must be collected over time. One-time measurements typically have limited value.

One difficulty in performing classical cost-benefit analyses of the hydrologic data networks is that the data in them are a "public good," are multipurpose, and continue to be used over and over without a loss in value. All of the many uses of the data cannot be envisioned when initial data collection occurs. This suggests that it is both economically inefficient and inequitable to allocate the cost of data collection, storage, and retrieval to the initial users of the data only. Costs are therefore estimated and allocated on the basis of historical studies of data use. These studies are also used in the continuous readjustment of the data collection networks themselves.

In order to facilitate data management and easy access to national network data by multiple users, the USGS has developed the WATSTORE computerized data storage and retrieval system which has been in operation for about 20 years and which contains much of the basic hydrologic data collected by the USGS since its establishment in 1879. The data accepted into the WATSTORE system undergo rigorous quality assurance and are then made available through every USGS District office and selected cooperator offices with whom the USGS has negotiated appropriate memoranda of agreement. The water-quality data component of the WATSTORE data base is routinely uploaded to EPA's STORET water quality data base where it is combined to facilitate use by EPA contractors and State agencies.

Most public and governmental inquiries to WATSTORE and to EPA's STORET water quality data base (through a formal memorandum of agreement) are made through the USGS's National Water Data Exchange (NAWDEX) clearinghouse program. The NAWDEX clearinghouse provides, through its centralized computerized indexing system, a means for Federal, State, and local scientists and technicians, and the private sector to learn who has what data and to actually access them directly in many cases: The NAWDEX clearinghouse currently maintains 76 inquiry centers around the Nation, operated by USGS and State agencies, who respond to about 85,000 inquiries per year on a cost-reimbursable basis. In addition to the inquiries made through the NAWDEX indexing system, over 100,000 accesses are made per year directly to the WATSTORE data base by scientists trained in the use of that data base.

6. **Roughly what percentage of your data bases would you estimate concerns surface water and what percentage relates to groundwater?**

In terms of data volume, about two-thirds of the WATSTORE data are surface-water records, and one-third are ground-water records. However, since surface- and ground-water systems are interrelated, virtually ALL of the data should be considered to be "related." The USGS has testified that the proposed Federal-level ground-water quality clearinghouse would have little value if it segregated the ground-water quality data component from the ground-water quantity and surface-water quality and quantity data components.

7. **On page 60 of the May 18 hearing transcript, Mr. Cohen testified that a task force has conducted several organizational meetings. Has the task force produced any results? Please list all major accomplishments?**

A Subcommittee on Ground Water has been established under the Committee on Earth Sciences of the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET). FCCSET is a part of the Office of Science and Technology Policy (OSTP) within the office of the President. The Ground Water Subcommittee has met on three occasions to develop a draft charter for its operation and to plan its initial activities. The charter was accepted by the parent Committee on Earth Sciences on April 15, 1988.

The Ground Water Subcommittee is now prepared to discuss a plan for categorizing and collecting information on Federal scientific programs related to ground water. The objective is to describe current activities and to provide a focus for discussions of plans for the future. The categories proposed, subject to Subcommittee approval, are: (1) Basic and applied research; (2) development and testing of methods; (3) resource assessment; and (4) technology and information transfer. Each agency would be canvassed to provide information on each of the programs they operate within each category. For each program the information would include dollar amounts spent or budgeted in each of the fiscal years from 1985 through 1989. This effort is a followup to the inventory prepared for the Interagency Task Force on Ground Water, and will provide the basis for future coordinating activities of the subcommittee.

8. **On page 64 of the May 18 transcript, Mr. Cohen testified that the coordination between federal agencies is "not great", but is "getting better." If this is so, why does the Geological Survey oppose S.1992?**

The USGS position regarding coordination was stated by Mr. Cohen in his written testimony on May 18, 1988: "... coordination of scientific and technical work is very important. However, there is already a great deal of interaction and coordination occurring. I believe the institutions needed to facilitate that coordination already exist. These include many bilateral coordinating committees and the multiagency FCCSET Committee on Earth Sciences, Subcommittee on Ground Water. As I mentioned in my opening remarks, the committee authorized by S.1992 would have a mandate so broad as to interfere with the timely execution of various statutory requirements related to ground-water protection."

Coordination of ground-water activities is inherently difficult due to the need for many agencies to conduct activities in literally thousands of locations around the Nation to support their mission programs. In the transcript of his oral testimony, on page 64, Mr. Cohen is shown to have stated that this coordination "was good and getting better." Both the science and the statutes related to ground water have changed rapidly over the past decade. These changes naturally result in rapid changes in agency missions and programs. It takes time for agencies to adjust their programs and their coordination mechanisms to meet these changing realities, particularly when jointly funded programs are involved. All of the agencies have been working hard over the past few years to make these adjustments. Most of the mechanisms needed are now in place to facilitate effective coordination among the field or regional offices of the various agencies, among headquarters staffs, and among agency research scientists. The progress on coordination is moving rapidly at the present time; hence the opinion that it "was good and getting better."

In recent years, the USGS has negotiated memoranda of agreement with many Federal agencies such as the Environmental Protection Agency, the Soil Conservation Service, the Bureau of Land Management, and the Corps of Engineers, and with literally thousands of State and local agencies to better coordinate efforts. More needs to be done. More will always need to be done. The establishment of the Ground Water Subcommittee under FCCSET is yet another step toward achieving the needed improvements in coordination. However, a rigid committee structure with the potential to reduce the authority of both scientific and regulatory agencies, as proposed in S.1992, is not a helpful step.

9. **USGS, as I understand it, is charged with coordinating the management of data on water. Yet our witnesses have testified that federal water data uses disparate parameters, comes in a variety of formats, and usually can't be cross-referenced. Only a limited amount of water data is on geo-based software. You testified that there is no need for S.1992 because federal agencies are already coordinating. Would you say that these problems with water-related data are examples of the coordinating that is now going on? What is a state that is trying to set standards for a groundwater program supposed to do when the data it receives from the federal government can't be cross-referenced? If the Administration believes, as we have heard repeatedly, that states should have the primary responsibility for groundwater management, then why haven't the appropriate agencies**

coordinated their data in order to help the states carry out their responsibility?

The Department of the Interior has lead agency responsibility for implementing OMB Circular A-67, "Coordination of Federal Activities in the Acquisition of Certain Water Data." The USGS Office of Water Data Coordination (OWDC) has delegated responsibility for the activity. In cooperation with two advisory committees representing about 50 Federal agencies and non-Federal organizations, OWDC has addressed the complex questions related to data compatibility to which this question refers. The coordination efforts have been ongoing for more than 20 years and specific actions have been taken to improve the accessibility and utility of ground-water information at all levels of government and the private sector. These actions include:

1. In 1980, OWDC published Chapter 2 of the National Handbook of Recommended Methods on Water-Data Acquisition, which is titled "Ground Water." This interagency effort took almost 10 years to complete primarily because ground-water science is a relatively new discipline for most organizations and there are few generally accepted procedures. The Handbook and updates to it are distributed to a mailing list of over 4,000.

2. The Federal advisory committee to OWDC recently completed a draft glossary of ground-water terms for subsurface-water flow and solute transport. Federal agencies undertook this multiyear effort because scientists do not have standard definitions for many ground-water terms. This draft glossary will be extensively reviewed by other organizations and then approved under the A-67 coordinating process. Once approved, the glossary will be widely distributed to help standardize communications about ground water.

3. In addition to the lack of generally accepted scientific definitions, major technical controversies exist regarding procedures for measuring ground-water quality information in the field. The USGS is working with EPA to develop consensus standards for ground-water monitoring in cooperation with the American Society of Testing and Materials.

4. In June 1988, OWDC completed negotiation of a cooperative agreement with the Interstate Conference on Water Policy whose members represent State agency water executives. The USGS is cosponsoring a series of regional workshops on ground-water information management to promote the use of standardized procedures, and common formats and nomenclature.

We are not aware of the source of the statement that only a limited amount of water data is on geo-based software. ALL computerized water data systems are "geo-based" in the sense that they include information about where the data in them were collected. The unifying feature of water data systems is the fact that all data are collected "somewhere." This "somewhere" is represented in data systems as a locational parameter. It is this locational parameter which needs to be standardized. This is the task of the new Federal Interagency Coordinating Committee on Digital Cartography (FICCDC), chaired by the USGS, which will attempt to develop a set of data transfer standards to provide, for the first time, a means for agencies to exchange and disseminate data to users in formats prescribed by the user. If all Federal water data systems included a standardized locational parameter, regardless of other system differences, the data could be combined, reformatted, and shared much more readily. It is the emergence of new technology (geographic information systems and data base management systems) that makes it possible to reformat and combine large data files for multiple uses.

10. **In your testimony, you mention the hydrogeologic mapping workshop that took place in Denver in May. We have heard from attendees that while appreciated, this workshop took a long time in coming, and indeed was the first such joint USGS-EPA effort to consult with the states and localities about their mapping needs. Please explain the length of time it took to prepare the event and the reasons for delays, if any.**

The Denver mapping workshop was conceived in July 1987, as the result of discussions among USGS and EPA staff who had identified issues regarding the mapping needs of the States to support State regulatory activities mandated by Federal statutes. A workshop work plan agreement was signed in September 1987, and workbooks, inventories of projects, exhibits, and other workshop materials were developed or compiled between September 1987 and May 1988. The participants of the workshop were 60 percent State, 20 percent Federal, and 20 percent from the private sector.

11. **I understand that the Committee on Earth Sciences did not actually establish the Subcommittee on Groundwater until December, and that its charter is still in draft form. This Subcommittee was apparently to have begun meeting in January of this year. There is no indication as to whether it has formally done so, or as to whether its charter has been finalized. Your agency has representatives to this Subcommittee. Please indicate the status of the charter, the number of meetings held, and the attendees of the meetings. Aren't your representatives primarily research--not policy--staff? what role do agency heads play in the Subcommittee? Do your representatives at least report to Dallas Peck about activities conducted? Should agency heads have a more active role? After all, they are the ones responsible for policy.**

The Subcommittee on Ground Water met formally on February 23, March 18, April 21, and June 23, 1988. The parent Committee on Earth Sciences accepted the draft charter of the Subcommittee during their meeting of April 15, 1988.

The purpose of this subcommittee is the coordination of science and information programs related to ground water. The members of the committee are, in fact, very high level officials in their respective agencies with responsibilities for managing their ground-water science and information programs. They are the people who set policy with respect to these programs. The membership of the Subcommittee on Ground Water is as follows:

Chairman

Dr. Robert W. Corell, Assistant Director for Geosciences, National Science Foundation

Members

Dr. Robert W. Long, Deputy Assistant Secretary for Science and Education, U.S. Department of Agriculture

Dr. John H. Skinner, Director, Environmental Engineering and Technology Development, Environmental Protection Agency

Mr. Philip Cohen, Chief Hydrologist, U.S. Geological Survey, Department of the Interior

Dr. Frank J. Wobber, Ecological Research Division, Health & Environmental Research, U. S. Department of Energy

Dr. Joseph Jehl, Council on Environmental Quality

Colonel Ted Cress, OUSDA (R&AT/E&LS), Pentagon, Department of Defense

Dr. Vincent Salomonson, Goddard Space Flight Center, National Aeronautics & Space Administration

Ms. Sandy Werner, Office of Management and Budget

Mr. Steve Parker, National Research Council, Water Science & Technology Board, National Academy of Sciences (Liaison)

Staff Associates
Dr. Lee Kolmer, U.S. Department of Agriculture
Dr. Alfred Lindsey, Environmental Protection Agency
Dr. Robert Hirsch, U.S. Department of the Interior
Mr. Ray Pelletier, U.S. Department of Energy
Dr. John A. Maccini, National Science Foundation

The USGS representative to the Subcommittee is Mr. Philip Cohen who is Chief Hydrologist in charge of the Water Resources Division of the USGS. He is the line manager over all USGS water programs. He reports directly to the Director of the USGS, Dr. Dallas L. Peck. Dr. Peck is, in turn, the

Chairman of the parent Committee on Earth Sciences to which the Subcommittee on Ground Water reports. Dr. Peck is well aware of the work of the Subcommittee and has been briefed on, and has provided significant input to, the development of plans for the Subcommittee. Mr. Cohen is authorized to deal with any and all policy or technical matters that might come to the attention of the Subcommittee.

12. **How is it that you maintain that you are not aware of duplication or overlap and yet, in a September 30, 1987 memo by the President's Science Advisor, he writes that, "[t]hese agencies presently coordinate their ground-water programs through bilateral committees and memorandums of agreement, but have identified deficiencies with this arrangement." Please comment on what coordinatory deficiencies the task force identified. These were, after all, apparently what led to the creation of the Subcommittee on groundwater under "FCCSET."**

The cited memorandum was an early working draft and is marked as a draft. It was prepared by one individual on the USGS staff. It was intended to be a cover memorandum to a draft charter for the Subcommittee on Ground Water. It was never submitted to the President's Science Advisor. The Subcommittee charter that was ultimately adopted is very much different from its description in that early draft cover memorandum (see response to question 14). The Interagency Task Force on Ground Water did not identify any deficiencies; rather it arrived at the suggestion of creating the Subcommittee on Ground Water as an appropriate management measure to help coordinate the $215 million per year Federal ground-water scientific effort.

It should be noted that bilateral committees can be ineffective in cases where many agencies become involved; and that memoranda of agreement, while useful in defining relative roles and missions or scoping out joint projects, are not always the proper vehicle for solving dynamic, day-to-day problems. The FCCSET Subcommittee on Ground Water is intended to supplement but not supplant these existing essential coordinating mechanisms.

13. **If there is indeed no unnecessary duplication or overlap, why does Point B of the draft charter of the "FCCSET" Ground water Subcommittee state that it shall "help ensure that these programs are complementary and not unnecessarily duplicative?"**

The very essence of scientific advancement produces some duplication and replication to allow different theories and approaches to be explored to solve problems. Our objectives should be to minimize unnecessary duplication and to assure that any duplication, *per sé*, is known and used to help verify theories and approaches to problems. The best way to achieve those objectives is through the FCCSET committee structure together with the continued use of bilateral committees and memorandums of agreement, as appropriate, and with continued efforts to provide investigators with access to current information on ongoing water-resources research.

14. **The Interagency Committee in S.1992 is designed to do the following:**
- **review the activities of each member agency to ensure coordination;**
- **identify and eliminate duplications and overlap among programs of member agencies;**
- **identify major state technical assistance, information, and research needs;**
- **develop overall priorities and a coordinated plan for addressing state technical assistance, information, and research needs;**
- **review groundwater information and data collected by member agencies and make recommendations to maximize the value of information collected for programs conducted at the federal, state, and local levels;**
- **facilitate interagency communication on technical assistance, information, and research and development programs which support state groundwater protection and management programs.**

Can a single Groundwater Subcommittee, with research staff and not agency heads as members, accomplish these goals?

As was stated in the answer to question 11, the membership of the Subcommittee on Ground Water consists of high level officials responsible for managing the ground-water science and information programs in their agencies. They are the ones who set policy with respect to these programs. The Subcommittee, under the direction of the agency heads on the parent Committee on Earth Sciences, is well-placed to accomplish its goals. The charter of the FCCSET Subcommittee on Ground Water is:

"(to) provide a forum for coordinating agency science and technology programs related to ground water. Its purpose shall be to increase the overall effectiveness and productivity of Federal research and information efforts related to ground water. By focusing on the principal nonregulatory functional elements of Federal ground-water programs (e.g., research, resource assessment, technology development, technical assistance, training, and education), the (subcommittee) can assist the Administration in assessing deficiencies, setting priorities, and evaluating alternative courses of action to address those deficiencies. In fulfilling its mission, the (subcommittee) should address significant science and information issues of national importance which cut across agency boundaries."

ENVIRONMENTAL POLICY INSTITUTE

Testimony of
Velma M. Smith
Director, Groundwater Protection Project
Environmental Policy Institute

before the

Senate Committee on Governmental Affairs
Subcommittee on Government Efficiency, Federalism, and the
District of Columbia

May 18, 1988

Good morning, Mr. Chairman, Members of the Committee. My name is Velma Smith, Director of the Groundwater Protection Project for the Environmental Policy Institute. On behalf of EPI, I thank you for this opportunity to share our views, and I commend your interest in the nation's groundwater resources.

As many of the Members of this Committee know well, groundwater is a vast and important national resource. In volume, our groundwater resources are some 20 times greater than all of the freshwater in our rivers, lakes and streams, and the availability of clean water from underground sources affects virtually all Americans.

Today some 117 million citizens rely on groundwater for drinking water; included in that number are 97 percent of rural households and more than one-third of the 100 largest U.S. cities. Forty percent of agriculture's irrigation needs are met by groundwater, and more than one-fourth of industrial water used in the U.S. comes from underground water sources.

Furthermore, groundwater is intimately connected with surface water, and the quality of our rivers and streams is undeniably linked to the quality of water flowing through aquifers which may or may not be tapped by drinking water wells. For example, some estimates indicate that a billion gallons of groundwater per day seeps into the Atlantic and Pacific Oceans and an average of 30 percent of the flows of surface streams comes from groundwater. Thus, polluted groundwater affects not only human beings who may drink that groundwater directly but also fish, wildlife and other surface-water users.

Yet, despite the importance of the groundwater resource to both human health and environmental quality, the need for its protection seems to have been overlooked for many generations, and today we are faced with a growing recognition that America's groundwater is in serious jeopardy.

Groundwater pollution is no longer discussed as a remote possibility affecting only a few communities. While a large percentage of the total resource may remain unpolluted today, groundwater problems have been reported in every state in the nation. Literally thousands of wells have been closed, and nearly 80% of the sites identified on the Superfund National Priority List manifest problems with groundwater contamination.

We do not presently nor will we ever have a complete picture of groundwater quality throughout the nation, but much of the data we do have is troubling indeed.

> The U.S. Geological Survey, after testing more than 120,000 wells across the country, found nitrate contamination in 48 states, with contamination levels in some states exceeding health standards in over 20 percent of the wells tested.
>
> Data from EPA's Groundwater Supply Survey, released in 1983, showed the presence of one or more industrial solvents in 28% of the randomly selected groundwater supplies serving populations of more than 10,000 persons.
>
> In Iowa, State officials have cautioned that as many as half of the State's 800 public water supplies may be contaminated with pesticides and other organic contaminants.
>
> A 1987 survey of private and public water wells in Minnesota found pesticides in 37 percent of the samples tested. Of the 225 private wells tested, more than 50 percent contained at least one pesticide.
>
> EPA's recent efforts to collect and review state pesticide detection data now indicate that over 60 pesticides have been detected in the groundwater of over 30 states. Reportedly, these detections are associated with legal application, not point sources such as storage, mixing or disposal.

And lest we forget -- as we tend to do -- that groundwater and surface water are connected, let me mention a couple additional examples.

> Discoloration of the swimming pond for two children's summer camps in New Hampshire in 1984 apparently prompted water quality sampling, which in turn indicated pollution with iron, manganese, acetone, toluene and methyl ethyl ketone. Leachate from a nearby landfill was reported to be the likely culprit.

> In 1985 the completion of a gas production well in Virginia had an unexpected effect. Grout pumped into the newly drilled well traveled through the groundwater to a spring which feeds a State-owned fish hatchery. Thousands of trout were lost and thousands more had to be transported to a clean water source.

Perhaps we face these unsettling statistics and troubling cases today because we entered the chemical age -- and clearly enjoyed its benefits -- with a mistaken notion that groundwater is immune from contamination. And now we find that we've manufactured, used and disposed of a host of substances, from degreasers to dioxin, with little regard for their potential to pollute groundwater. Historically, we haven't worried too much about landfilling our garbage, pouring or even pumping toxic chemicals into the ground, reapplying chemical fertilizers and pesticides on farm fields year after year, or storing wastes in slowly leaking ponds, euphemistically perhaps called "evaporation" ponds.

Now it becomes clearer every day that groundwater is not uniquely protected from contamination. In fact, groundwater is vulnerable to contamination from a wide variety of activities that occur in every community across the nation.

The diversity of groundwater contamination sources runs the gamut from the homeowner's malfunctioning septic tank to the byproducts of the nation's defense system. Oil-drilling, road-deicing, farming, mining, chemical storage and just "throwing away" our household trash may affect and degrade groundwater resources. The Office of Technology Assessment in its report entitled Protecting the Nation's Groundwater from Contamination compiles a large list of groundwater contamination sources, and the National Research Council in Ground Water Quality and Local Strategies warns that "virtually all human activity" may affect groundwater.

Along with the diversity of causes, we also find a diversity of existing Federal and state authorities to prevent, detect and correct groundwater contamination. At least eight major Federal laws speak to the issue of groundwater to some extent, and within each state it is possible to find as many as seven agencies dealing with groundwater issues. In 26 states or territories numeric water quality standards can be applied to groundwater; 15 states or territories use narrative standards; and 23 utilize both narrative and numeric groundwater quality standards. The same recently released General Accounting Office Report that provides us with those statistics also indicates that at least 22 states have written groundwater plans or strategies.

But while the states boast of "strategies" and the lawbooks provide us with a great many pages of text devoted to groundwater, there are hundreds of communities across this country with citizens who will attest to the failure of those laws, the associated regulations and the enforcement mechanisms that are supposed to give their groundwater adequate protection.

The Environmental Policy Institute and a host of other public interest organizations believe that the appropriate response to this situation is the establishment of a comprehensive Federal groundwater protection program, aimed at preventing the degradation of our groundwater resources and based primarily on a scheme of minimum Federally-established and State-implemented controls on the sources of groundwater pollution. In other forums we have called on Congress to adopt legislation along these lines, and today we would urge the members of this Committee to carefully consider the pressing need for such legislation.

Of the pieces of groundwater legislation introduced in the 100th Congress to date, EPI believes that S. 2091 and S. 2092 taken together represent the most far-sighted and promising approaches to preventing groundwater contamination throughout the country. We would respectfully urge the Members of this Committee to join Senators Dave Durenberger and Max Baucus in sponsorship of this important environmental legislation.

But, rather than speak today in detail on the many aspects of those bills or on the overall response to groundwater pollution which has become an absolute necessity, I will narrow my comments this morning to the aspects of the groundwater issue which are of most direct interest to this Committee on Governmental Affairs. While that area of interest -- namely interagency and intergovernmental coordination -- is but one aspect of this larger issue, it is clear that the coordination challenge is an important element in an overall solution to our country's groundwater problems.

In the words of the National Research Council,

> Ground water protection programs must link local, state, and federal activities into coherent, coordinated action to be effective. Ground water is affected by a wide variety of human activities and land uses. Moreover, ground water is affected by and, in turn, affects all other environmental media -- land, surface water, and air. Consequently, a strong, coherent intergovernmental program is essential in protecting ground water.

In this regard, EPI is pleased to commend the Chairman, the ranking minority member and other members of this Committee who have joined in sponsoring S. 1992. In general, we believe that this legislation sets out a useful approach to enhanced coordination and communication among the many Federal agencies whose actions have a bearing on groundwater quality. In addition, S. 1992 rightly recognizes that local and state governments are active and important players in efforts to protect groundwater, and, therefore, their particular day-to-day needs for information and technical assistance should be heard and addressed by the Federal agencies.

Certainly, as this Committee deliberates on this particular legislation, you will hear that the Federal agencies with major roles in groundwater -- specifically, the Environmental Protection Agency, the U.S. Geological Survey and the U.S.

Department of Agriculture -- have made strides in the effort to communicate and coordinate on behalf on improved groundwater protections. We believe that there are signs -- such as the involvement of the USGS in the implementation of EPA's Pesticides in Drinking Water Survey -- that indicate that communication has indeed been improved. The various agencies are to be commended for these efforts.

Your legislation, in our view, does not disregard these efforts; nor will it impede them. Rather, it provides a means for that communication and coordination to continue and to be enhanced.

Again, if we listen to authorities such as the National Research Council and the Office of Technology Assessment, we will recognize that the nature of the groundwater resource and the diversity of the threats to that resource present us with a considerable challenge indeed. At the Federal level alone, there are many, many departments and agencies whose activities may impact the quality of groundwater -- and whose failure to recognize that impact or to participate in a coordinated effort to protect groundwater could, in essence, sabotage otherwise worthwhile efforts of state and local governments or other Federal agencies.

From the *Federal Aviation Administration*, which last year was reportedly issuing an advisory on airport fire-fighting training practices that threaten groundwater, to the *Soil Conservation Service* with its mandate to develop soil conservation plans which speak to the specific agricultural practices used by individual farmers; from the *U.S.G.S.* and its *cooperative program* which has made possible many state efforts to develop scientifically-sound groundwater resource assessments, to the *EPA Office of Solid Waste*, which has regulatory experience and authority over numerous sources of contamination to groundwater; from the *Bureau of Land Management* whose properties include an estimated 450 landfills, most of which are not in compliance with basic EPA standards according to the House Committee on Government Operations, to the *Departments of Defense and Energy* which have bestowed upon countless communities across the country some of the worst groundwater cleanup problems known today and some of the most persistent and frustrating cases of chronic noncompliance with state and Federal environmental laws -- each of these agencies and departments as well as others should be sharing information and expertise and working together to protect groundwater.

To the extent that various entities of the Federal government have now developed memorandums of understanding or other formal agreements on certain aspects of groundwater problems, and to the extent that such understandings provide for more certain or swift application of protection measures, then those agencies are to be commended. But establishment of specific understandings or protocols for addressing particular groundwater issues does not, in our view, obviate the need for ongoing communication and coordination on a broader scale. Your legislation addresses this need.

One particular case may point to the value of continued communications over time. A recent letter written by Congressman George Brown to Secretary of Agriculture Richard Lyng speaks in part to the evolution of national consciousness regarding the value of integrated pest management -- in general an approach to agricultural production which seeks to restrict the dependence on chemical controls by "integrating" a judicious use of chemicals into a broader program of pest management, including biological controls, altered cropping practices and careful scouting for pests. As Congressman Brown points out, during the debate on IPM research needs in the 1970s, some saw IPM "as a plot by the environmental movement to end modern agriculture....But as insect resistance to pesticides rose, and as the scientific basis for IPM was proven, the farm sector embraced IPM and came to demand increased research and extension work on it."

Congressman Brown's letter and a review of agriculture-related literature gives clear indication that the nation is in a period of changing notions about low-input or sustainable agriculture in general. The idea that agricultural production could be continued successfully with lowered dependence on expensive and potentially dangerous chemical inputs now draws favor not only from environmentalists but also from many farmers. Considerable though uneven research and demonstration on various low-input agricultural practices now takes place in many agricultural areas across the nation, and successes with low-input agriculture may well provide solutions to pressing problems with the leaching of pesticides into groundwater.

Unfortunately, however, the information from this type of research still appears to have a difficult time in reaching not only the farm producers but also the other Federal agencies making critical decisions on the regulation of agricultural chemicals -- namely, EPA's Office of Pesticide Programs.

Just a few weeks ago, the Subcommittee on Environment, Energy and Natural Resources of the House Government Affairs Committee held an important oversight hearing which addressed, among other things, these particular problems. In this hearing, Committee Chairman Mike Synar learned from the Director of EPA's Office of Pesticides and Toxic Substances that when EPA reviews a problem pesticide for potential cancellation and makes its assessment of the pesticide's risks and benefits, as required by law, it generally does not consider non-chemical pest control methods that may be available to the producer. Although I am unable to quote directly, since the Committee transcript is not yet official, I believe that it is fair to conclude from various lines of question and answer that EPA does not now work closely with U.S.D.A. to identify, publicize or encourage the substitution of non-chemical alternatives -- even when the chemical alternatives have been found to cause groundwater pollution or threaten human health.

In our view, this is one example of potential joint problem-solving that might turn out differently if representatives of the various agencies were required to meet and to report to Congress on an ongoing basis. In this particular case, we find that although the public concern over groundwater pollution has pressed EPA to the point of developing a Pesticides in Groundwater Strategy, and although the concepts of low-input agriculture are coming into wider public acceptance, the two agencies whose respective expertise might jointly offer the most promising means of mitigating and eventually eliminating pesticide contamination of groundwater have apparently yet to link their efforts in a truly productive fashion.

As another brief example of where improved communication may foster creative, cross-Agency solutions to groundwater problems, we note that under the Surface Mining Control and Reclamation Act's permit application regulations, mine operators are required to submit detailed technical analyses, including cumulative hydrologic impact studies and water monitoring data. This information is necessary for permit reviewers to determine the likelihood of successful reclamation and compliance with the law.

Unfortunately, however, this voluminous information too often receives scant review by the Office of Surface Mining before it is stored and shelved within that Agency -- where it becomes virtually inaccessible to others. Certainly, this comprehensive and critical data could be utilized for other purposes; given access to such data and to valid scientific interpretations of the data, state oil and gas regulators might identify critical hydrologic areas where drilling activities should be subject to special controls, individual communities might be helped with the development of wellhead protection plans, regional waste facilities could be more appropriately sited with better information, and Federal RCRA permit writers might better assess the possible flow patterns for contamination from hazardous waste facilities. But if those who are responsible for these other programs are either unaware of the existence of this data or faced with an insurmountable data retrieval problem, then those side-benefits of the collection of such data will never be realized.

As my last example indicates, EPI believes strongly that local and state government officials as well as Federal regulators can benefit from a better coordinated groundwater protection effort. We are particularly pleased to see that S. 1992 calls specifically for the creation of an advisory group which will relay to the Federal government the information and technical assistance needs related to groundwater that are encountered at the community and state level. In our view, it is this aspect of the bill which may best help to identify current gaps in the research, information and regulatory patchwork that exists.

Far too frequently, the Federal research agenda is set exclusively by a combination of individuals oriented toward academic-type research and those who work solely in the context of national policy. In the groundwater arena, this may result in useful and needed programs to advance our "state of the art" understanding of such factors as groundwater flow system analysis and prediction, chemical degradation in underground environments, unsaturated zone monitoring and the like. It may also net us a better overall picture of the most pressing "national" threats to groundwater.

But it probably will not help a local community adopt a comprehensive plan and zoning ordinance that protects highly vulnerable karst geology regions; it may not tell a state how to develop a workable program for wellhead protection of public water supplies that meets the mandates of the Federal Safe Drinking Water Act; it may not assist a regional authority with selection of the most suitable site for municipal waste disposal; and it may not even speak to the town of less than 500 people who finds its community water well contaminated and has no idea of how to respond.

While basic scientific research and broad-based national or regional studies should, of course, continue, EPI believes that our groundwater research agenda must become more responsive to the needs and the practical limitations faced by those who are most often on the front-line in dealing with groundwater contamination threats and problems -- the local and state regulators and officials. When it comes to groundwater, we must remember that many, many communities simply cannot afford or don't need "the state of the art." The most recent advances in groundwater remediation or contaminant transport modeling are, for many communities, simply not relevant. What those communities need may be practical, affordable and reliable means of protecting groundwater and responding to groundwater contamination incidents. Given the opportunity to directly advise the Federal government on their technical assistance and information needs, we would predict that local and state representatives will not only identify specific substantive needs but also suggest useful formats and levels of aggregation or detail for information presentation.

As you well know, Mr. Chairman, information that is helpful to EPA Administrator Lee Thomas may well be of little use to the Mayor and Town Council of a small town in Tennessee. While the U.S.G.S. can offer volumes of text and information about major regional aquifer systems, and EPA works to promote a questionable scheme for classifying groundwater in increments based on a 2-mile radius around a regulated facility, a local decision-making body may wish to encourage industrial development in an area least vulnerable to groundwater contamination or spend limited capital improvement dollars on sewer lines where septic systems are least likely to function properly. Such decisions can have a significant impact on groundwater protection, but they cannot be made correctly without hydrological information on a pertinent scale.

As many of the members of this Committee know, there is currently raging a considerable debate over the extent to which the Federal government should become more involved in groundwater quality regulation. There are those who would have us quake at the thought of a traditional Federal environmental role in this arena -- the setting of national Federal minimum protections that will safeguard citizens from Minnesota to Mississippi and offer protections to future generations as well as the current one. Within this debate, our organization unabashedly and we feel rightly calls for a much stronger Federal role in groundwater protection.

We do recognize, however, that under either the status quo approach or under a new program which vests more authority in the Federal government, the states and local governments will remain as pivotal players in implementation and response. In this role, those officials should be offered the best and most usable tools that the Federal government can share, and the provision of S.

1992 which calls for an advisory committee of state and local officials is one which we are happy to support.

We would only caution that you may wish to consider language to assure that the representation for that committee is drawn from a good cross-section of states and communities, representing both those which have advanced programs of groundwater protection and those which do not, representing urbanized and rural areas, representing differing hydrological settings -- in particular, both confined and nonconfined aquifer settings -- and representing differing levels of resources and existing technical expertise.

In conclusion, Mr. Chairman, we again thank the Committee for its interest in groundwater protection, and we support the provisions of S. 1992 as one part of a much-needed Federal response to groundwater problems.

We appreciate this opportunity to testify, and I would be happy to answer any questions that the Committee may have.

TESTIMONY OF ERIC DRAPER

Mr. Chairman, my name is Eric Draper. I direct Clean Water Action Project's groundwater protection efforts. We are a 400,000 member organization with operations in 15 states. I appreciate the opportunity to offer testimony before the Subcommittee on Government Efficiency, Federalism and the District of Columbia of the Senate Committee on Governmental Affairs.

The members of Clean Water Action support a comprehensive national groundwater protection policy with a goal of non-degradation and controls on individual sources and classes of pollution. The proposed legislation, S. 1992, could contribute to the creation a comprehensive national policy. Groundwater protection requires cooperation and coordination by federal agencies in the areas of research, resource assessment, technical assistance, and contamination prevention, control and cleanup technology. S. 1992 identifies this need and directs agencies to work together and with state and local agencies to protect groundwater.

One-half of America's drinking water comes from groundwater sources. Nearly all rural Americans depend on groundwater. This valuable resource is under attack from numerous sources including agricultural chemicals, solid and hazardous waste facilities, petroleum and chemical storage and transportation, road maintenance, and animal and human waste disposal.

Substances ranging from carcinogenic pesticides to pathogens, from dangerous gasoline additives to nuclear waste, are being found in increasing numbers in water wells. Little is being done at any level of government to prevent, control or remedy the massive threat to our water.

Groundwater contamination is widespread. It is the inevitable and predictable result of some activities such as mining and agriculture. It is also the careless consequence of wasteful and waste producing and waste disposal activities. Contamination has occurred in every state. In hundreds of cases, this has led to costly cleanup, treatment and the need to exploit alternate drinking water supplies.

Current evidence of groundwater contamination from human activities supports extensive groundwater protection efforts. Remedies for existing contamination are difficult and expensive. Prevention of contamination through reducing waste and activities that introduce pollutants to groundwater is the only reasonable approach to protection of the resource.

The nation has no coherent policy to prevent abuse of and degradation of groundwater. Federal agencies have done little, cooperatively or independently, to anticipate and solve groundwater contamination problems. S. 1992 would direct agencies to work together.

Other proposed legislation, S. 2091, The Groundwater Protection Act, takes a regulatory approach. It shares with S. 1992 the recognition of the need for cooperation and coordination between federal agencies and states. A truly protective and preventive groundwater policy would be based on a national goal of non-degradation; would inventory and survey the nation's groundwater resources and sources of contamination; would establish controls, standards and protections for groundwater; would restore contaminated areas; and would support those activities with research, information, education and technical assistance.

Until we have a comprehensive national groundwater protection policy, we need ambitious and coordinated programs by all agencies which can find cause in their chartered activities to protect groundwater. Some agencies such as the Environmental Protection Agency have been charged with protecting and restoring groundwater. Others such as the Department of Defense have been major polluters. Units of the federal government should be brought together and given the charge of marshalling their resources to protect groundwater. In the face of imminent threats, the imperative is to act. Acting together is necessary in many cases.

Mr. Chairman, on a recent flight to the Midwest I was the captive audience of a farmer who was also an officer of a major farm commodity association. The farmer relayed to me the history of his increased use of agricultural chemicals to increase his yields. He was shocked when I responded to the description of his activities by showing him a map of groundwater contamination in his state. The maps showed detections of the chemicals he uses. He was further shocked when I showed him health-based standards for his chemicals. The methods of farming being pushed by the Extension Service were directly responsible for his chemical use. Yet he offered no example where he was technically assisted in managing his use of the water contaminating chemicals.

To cite another situation, my organization recently provided support to a group in Oklahoma which is trying to stop a Department of Energy contractor from disposing of process wastewater from nuclear fuel processing by spraying it onto the ground. The facility in question has an excellent opportunity to prevent contamination by changing its production processes to eliminate waste. DOE should use prevention and waste reduction criteria in assigning contracts.

The recent history of toxic waste management and cleanup is littered with examples of how the Department of Defense has created enormous public health threats in the form to toxic dumps. Now valuable national defense funds are being spent on remedial action to clean up groundwater contamination at this dump.

Yvonne Woodman of Duval County, Florida and her family were relocated from their home after the discovery of a nearby toxic dump. One of the major responsible parties at the site is the Jacksonville Naval Air Base.

Road salts have destroyed drinking water supplies in Western Massachusetts, but it is doubtful that the Department of Transportation has looked to assist states with an alternative method for handling road ice.

Other examples of past practices could be noted, but it is the current state of affairs with which we are most concerned. In addition to the Department of Energy and the Department of Defense, the U.S. Department of Agriculture and the Department of Interior all have a role to play in increasing groundwater protection.

We have seen examples of state-level cooperation between agencies to remedy groundwater contamination problems. In 1983, when the State of Florida discovered widespread contamination of groundwater by pesticides, several agencies gathered into a task-force to develop policies to reduce future contamination threats.

Minnesota agencies, including the Department of Health, the Pollution Control Agency, the Department of Natural Resources, local governments, and Soil and Water Conservation Districts, are now developing a state groundwater protection strategy. The elements of the program include: protecting quality, providing safe supplies, increasing knowledge and information, coordinating within the state and with the federal government, and providing public information and technical assistance so that decisions affecting water quality can be made in an informed way.

Like state agencies in Minnesota, federal agencies, though more diverse and removed from specific problems, can and should work toward a common goal of protecting groundwater. S. 1992 provides an essential directive to federal agencies.

The provisions of S. 1992 that require review of agency actions, avoidance of duplication, increased communication and sharing of information are also found in other bills. The assignment in S. 1992 of identifying and planning for technical assistance, information and research is an important feature of the legislation.

A review of state groundwater protection activities reveals that information and technical assistance are major unmet needs.

But while coordination of research, information dissemination and technical assistance are necessary, more resources and authority need to be invested to actually realize groundwater protection goals.

Current levels of funding and effort for groundwater protection within all agencies are inadequate. New initiatives must be launched to survey and inventory the resource and to understand, prevent and control sources of contamination. Much of the authority for this must lie with the U. S. Geological Survey and EPA.

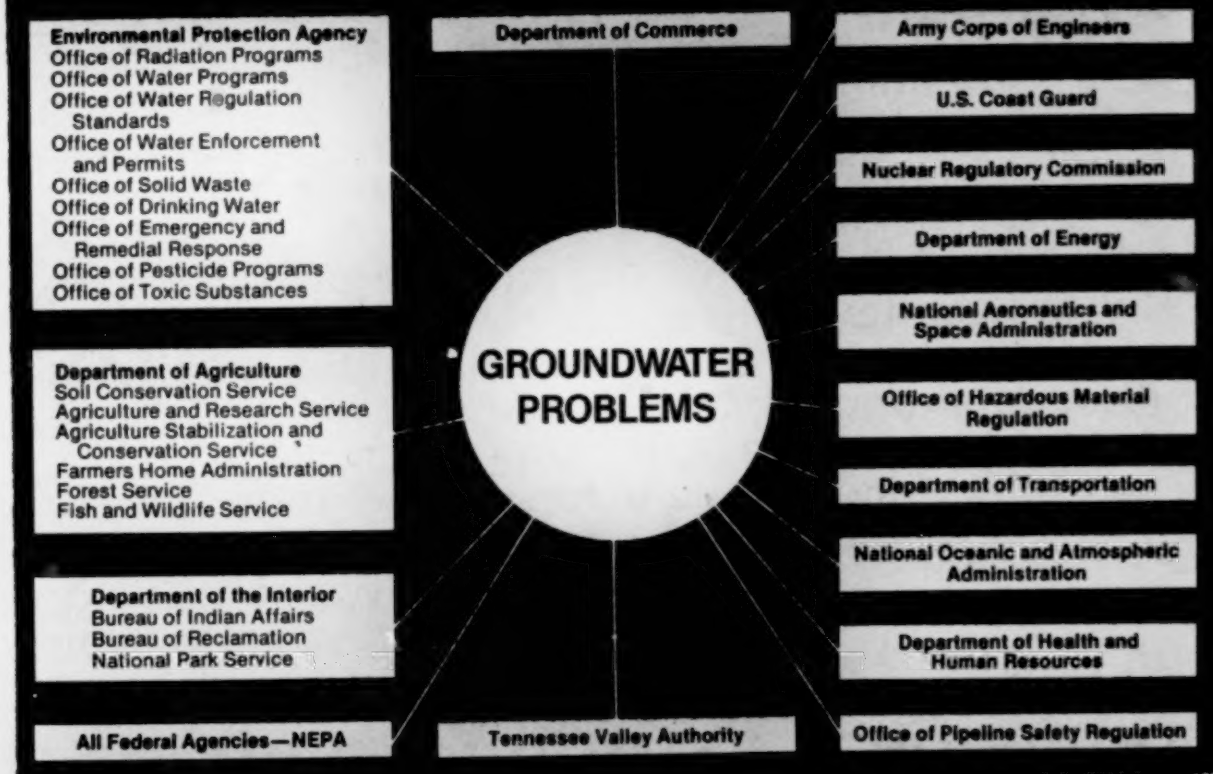
Congress should declare that groundwater must not be degraded in any way and must enact laws sufficient to give EPA the power to work with states to achieve that goal. The core of groundwater protection regulation should be reduction of waste, waste creating activities, and a halt to practices leading to the introduction of wastes into groundwater.

A comprehensive national groundwater policy must

1. Have research, data collection, monitoring and inventories to determine current groundwater quality and quantity.
2. Require EPA to issue standards for drinking water wells not currently protected by the Safe Drinking Water Act
3. Develop practices and methods to prevent, detect and control sources of contamination,
4. Give additional protection to especially vulnerable areas,
5. Assist states in developing and implementing controls,
6. Recognize that groundwater often interchanges with surface water and extend surface water controls to include groundwater,
7. Implement waste reduction as a primary form of protection,
8. Identify and enact technological controls on all sources of contamination,
9. Conduct targeted and random assessments of contamination,

S. 1992 takes us several steps toward protecting groundwater and provides an essential step of inter-agency coordination prior to regulation. The approach taken provides a key element in the push for greater protection.

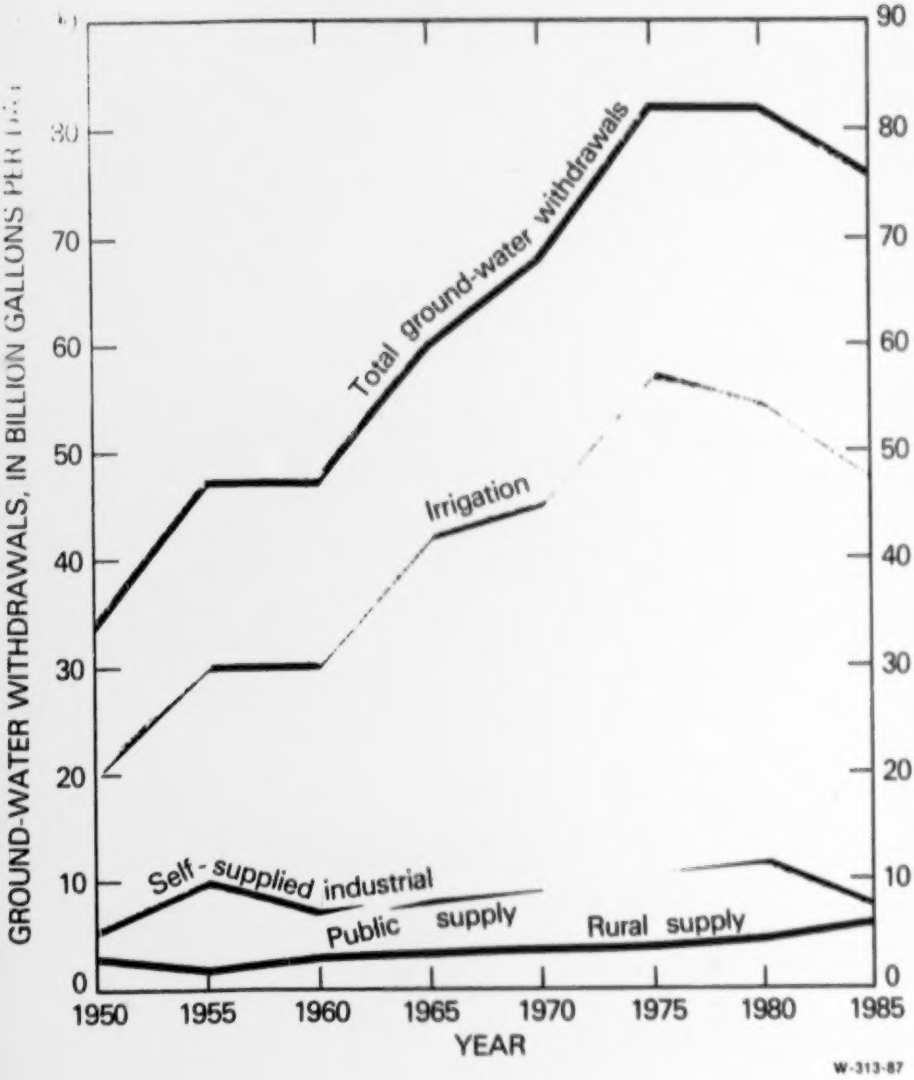
Federal Entities with Responsibility for Managing Groundwater


GROUNDWATER PROBLEMS
Environmental Protection Agency
Office of Radiation Programs
Office of Water Programs
Office of Water Regulation Standards
Office of Water Enforcement and Permits
Office of Solid Waste
Office of Drinking Water
Office of Emergency and Remedial Response
Office of Pesticide Programs
Office of Toxic Substances
Department of Agriculture
Soil Conservation Service
Agriculture and Research Service
Agriculture Stabilization and Conservation Service
Farmers Home Administration
Forest Service
Fish and Wildlife Service
Department of the Interior
Bureau of Indian Affairs
Bureau of Reclamation
National Park Service
All Federal Agencies—NEPA
Department of Commerce
Tennessee Valley Authority
Army Corps of Engineers
U.S. Coast Guard
Nuclear Regulatory Commission
Department of Energy
National Aeronautics and Space Administration
Office of Hazardous Material Regulation
Department of Transportation
National Oceanic and Atmospheric Administration
Department of Health and Human Resources
Office of Pipeline Safety Regulation

Federal Groundwater Legislation

Atomic Energy Act
Clean Water Act
Coastal Zone Management
Superfund – Comprehensive Environmental Response
    Compensation and Liability Act
Federal Insecticide, Fungicide, and Rodenticide Act
Federal Land Policy and Management Act (mining)
Hazardous Liquid Pipeline Safety Act
Hazardous Material Transportation Act
National Environmental Policy Act
Reclamation Act
Resource Conservation and Recovery Act
Safe Drinking Water Act
Surface Mining Control and Reclamation Act
Tennessee Valley Authority Act
Toxic Substances Control Act
Uranium Mill Tailings Radiation Control Act
Water Research and Development Act

TRENDS IN GROUND-WATER WITHDRAWALS, 1950-85



ASSOCIATION OF STATE AND INTERSTATE WATER POLLUTION CONTROL ADMINISTRATORS
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TESTIMONY OF THE ASSOCIATION OF STATE AND INTERSTATE WATER POLLUTION CONTROL ADMINISTRATORS

BEFORE THE SENATE

SUBCOMMITTEE ON WATER RESOURCES

AND THE

SUBCOMMITTEE ON HAZARDOUS WASTE AND TOXIC SUBSTANCES

FEBRUARY 23, 1988

Mr. Chairman, Members of the Subcommittees:

My name is Harold Reheis. I am the Assisitant Director of the Georgia Environmental Protection Division and the Vice Chair of the Association of State and Interstate Water Pollution Control Administrators' (ASIWPCA) Groundwater Task Force.

I am joined today by Roberta (Robbi) Savage, the Executive Director and the Secretary Treasurer of our organization.

ASIWPCA is the national, professional organization of State water administrators and interstate commissioners throughout this country. ASIWPCA members are responsible for the daily implementation of State water programs and work to assure their effectiveness and integrity in the States.

Among our ASIWPCA membership, we have environmental and natural resource commissioners and heads of State agencies which provides the Association with the breadth of experience and understanding to effectively relate our positions to other environmental programs including hazardous waste and solid waste management, air quality control, pesticide management. For example, I am responsible for the management of Georgia's water quality/quantity programs, along with our programs for air, solid and hazardous waste, land protection, and emergency response.

Mr. Chairman, I assure you that groundwater is a major priority with the States. As has been documented by your staff and representatives of a number of national organizations, States are on the cutting edge of the groundwater protection effort. And, in addition to the plethora of individual groundwater programs developed by the States, our national organization, ASIWPCA, has taken a lead role in providing technical exchange and program assistance to its State members. For example, ASIWPCA recently polled its members on groundwater issues, with 43 States responding. The results of that survey will be referred to throughout this testimony. ASIWPCA's position statement (attached) will also be mentioned.

As indicated, our Association has a major interest in the groundwater issue, and has done considerable work as an organization on addressing solutions to groundwater problems. For example, the Task Force of which I am Vice Chair concentrates entirely on groundwater. ASIWPCA has sponsored numerous State roundtable discussions and has in the last few years, hosted two national technical conferences for State groundwater officials.

To encourage statewide consistency, ASIWPCA has held policy and program discussions with other State organizations, such as the National Governors' Association, the Association of State Drinking Water Administrators, the Association of State and Territorial Solid Waste Management Officials, and the Western States Water Counsel.

BACKGROUND

Groundwater is the principal source of drinking water for more than 50% of the American population. With the continuing development of more effective techniques for monitoring the quality of groundwater supplies, States are increasingly concerned with maintaining and improving their groundwater quality. Under States' authorities for water, State officials are responsible for protection of the "waters of the State" (which includes groundwater) and, as a result, regulate various pollution sources which threaten groundwater quality or quantity. In fact, State groundwater management programs incorporate both preventive and remedial measures.

In addition to clean up activities, States report a number of preventive activities currently underway, including: permitting and surveillance of potential contamination sources; siting requirements for industrial and municipal waste-generating facilities; pesticide and fertilizer use; and animal waste management; public education; and prohibition of certain activities, such as land disposal of toxic sludge and hazardous waste.

Significantly, most States are now allocating and managing groundwater quantity. Because excessive pumping accelerates the development of conditions conducive to groundwater quality degradation, sound groundwater allocation is essential. It cannot be over emphasized, however, that groundwater allocation is solely a State responsibility and any Federal law designed to address water quantity would be an unacceptable encroachment on State water rights.

Many States throughout the country have rigid requirements for deep drilling for oil, gas, and minerals as well as for licensing and regulating well-drilling professionals. Training and certification programs for well drillers, to ensure proper installation procedures and well construction, have been established in most States as an additional management tool to prevent groundwater contamination.

STATE LEADERSHIP

States have very appropriately taken the lead in developing and implementing procedures to cleanup and protect this precious resource. And, it is our view that institutional arrangements for groundwater quality programs are the prerogative of the States and based on the unique legal, economic, and social conditions in each State.

Mr. Chairman, the policy statement adopted by the nation's Governors succinctly reflects the State perspective:

- The Governors endorse and recommend "a new national policy to systematically accelerate and strengthen protection of our underground water supplies"...
- "This policy must articulate the States' primary authority and responsibility for groundwater management"...
- "States are best equipped to respond to the local nature of groundwater and must have substantial flexibility to design programs responsive to the resources within their boundaries."

STATE ROLE

The ASIWPCA position is even more specific:

1. The States must continue to be fully responsible for management of groundwater quality and quantity. Institutional arrangements should be the prerogative of each State based on the unique legal, economic, and social conditions, as well as regional, geologic and climatic conditions, which control groundwater quality and quantity.
2. States should determine the degree and extent of groundwater pollution and consider the effects of degradation of other States' waters.
3. States should develop and maintain comprehensive groundwater quality programs.
4. States should provide adequate financial support to achieve and maintain groundwater quality programs.

Federal legislation must preserve the lead role for State management of groundwater quality and quantity. States should be responsible for groundwater quality standards, classification systems (with State discretion for uniform classifications), resource assessment, protection strategies development and monitoring programs.

State programs should be developed to assure compliance with relevant groundwater standards. Pollution sources of national concern include: solid waste disposal, hazardous waste disposal on land surface and subsurface, pesticide use, and underground injection activities. States should certify that their program elements meet the requirements of the Federal law. In addition, State programs should recognize and encourage local roles in groundwater protection (e.g. land use). Periodic State reports on groundwater quality should be made to USEPA.

ASIWPCA's groundwater questionnaire indicates that 98% of States use permits to control discharges to groundwater. Furthermore, 77% of the States have comprehensive groundwater quality regulatory systems or protective strategies in place, and the remaining 23% will have such systems or strategies in place before the end of 1988.

States are actively monitoring groundwater under the Safe Drinking Water Act requirements for public water supply systems. In addition, 70% of the States are conducting other types of groundwater monitoring, with 50% operating statewide ambient groundwater monitoring networks. It is important to recognize that States already have a broad base of State legislation, regulation and monitoring data with which to manage groundwater quality. In 13 categories of groundwater quality problems we identified which are not currently covered by the major Federal groundwater laws, at least 70% and as high as 98% of the States indicate that existing State laws and/or regulations are adequate to address these problems.

FEDERAL ROLE

ASIWPCA'S groundwater position also outlines the appropriate Federal role:

1. The Federal government should provide technical assistance, support research and development, and disseminate information to States.
2. The Federal government should assist States in the review and definition of geologic and climatic conditions controlling groundwater quality and quantity. The Federal government should have no responsibility in groundwater quantity management.
3. The Federal government should involve States in Federal activities and provide adequate financial support for State program elements addressing interstate groundwater quality.
4. The Federal government should provide States with mechanisms to translate research results into usable recommendations and guideline values.

FEDERAL LEGISLATION

Existing Federal laws and regulations have not addressed groundwater in a coordinated manner and have created numerous administrative and statutory inconsistencies.

To give you an idea of the plethora of complex statutory authorities currently governing the protection of our groundwater, we have listed the principal statutes below:

- Clean Water Act,
- Safe Drinking Water Act,
- Resource Conservation and Recovery Act,
- Comprehensive Environmental Response, Compensation, and Liability Act,
- Federal Insecticide, Fungicide, and Rodenticide Act,
- Surface Mining Control and Reclamation Act,
- Toxic Substances Control Act,
- Atomic Energy Act,
- Coastal Zone Management Act,
- Federal Land Policy and Management Act,
- Hazardous Liquid Pipeline Safely Act,
- Hazardous Materials Transportation Act, and
- Uranium Mill Tailings Radiation Control Act.

Because of this morass of Federal requirements, it is not surprising that of the States polled:

- 60% believe that inconsistencies or duplications in Federal laws have created problems in groundwater protection.

- 95% agree that Federal environmental laws related to groundwater should be changed to achieve better coordination and consistency.

By way of a hypothetical example of administrative and statutory inconsistencies, imagine three independent industries, all producing waste with heavy metals and all located within a half a mile of each other. Industry A discharges its wastewater into a holding lagoon that is actively used and covered under RCRA. Industry B at one time put its waste into a holding lagoon and the inactive lagoon is now covered under Superfund. Industry C discharges its waste into a lagoon which has an National Pollutant Elimination and Discharge System (NPDES) permit to discharge its effluent into a local stream, as authorized under the Clean Water Act.

Assuming that all three lagoons are leaching heavy metals into the same aquifer at essentially the same rate, you would naturally assume consistent corrective actions should be taken for all three. Regrettably, this is not the case because, under current Federal laws and regulations, Industry A is required to cleanup its groundwater contamination to the point that it equals the natural or background quality of local groundwater. Industry B is required to do a cleanup that is determined to be "cost effective". Industry C may not be required to address groundwater.

The bottom line is this. All of these industries are creating essentially the same type and magnitude of contamination. However, the requirements for action under existing Federal statutes are vastly different. This type of inconsistency significantly retards the States' efforts to implement a sensible, comprehensive and effective groundwater management program.

ASIWPCA RECOMMENDATIONS

ASIWPCA members recognize the potential for enactment of some type of groundwater legislation. However, States are convinced that any such legislation should address the comprehensive nature of groundwater and the plethora of existing Federal legislative mandates currently imposed on State and local governments. ~~This does not mean, however~~, that Federal ~~legislation should simply duplicate existing requirements. ASIWPCA recommends that any new Federal groundwater~~ legislation incorporate the following:

- The National focus, both in terms of research and regulation, should be on manmade contaminants which adversely affect human use of groundwater and human health. Areas of research, for example, which do not relate directly to prevention or remedial action for human-induced contaminants are of lower priority.

- The National goal must be to protect human health and the environment by preventing and mitigating groundwater pollution wherever possible. Groundwater must be protected for the highest identified and potential use, as determined by the States.

, not us -

In addition, ASIWPCA recommends that any legislation encompass five main principles:

1. USEPA must quickly develop health-based criteria for a reasonably large number of common or pervasive groundwater contaminants.

2. States must classify their groundwater and adopt ambient groundwater quality standards using USEPA's criteria as guidelines.

3. Upon adoption, each States' standards should become the basis of cleanup or control under any Federal program relating to groundwater in the State.

4. States must define and implement programs to assure attainment and maintenance of groundwater standards and to minimize groundwater quality degradation.

5. State groundwater programs must address contamination sources of national concern to the extent that such sources are significant in that State.

FUNDING

The States are already carrying out significant activities to assess, monitor, protect and manage groundwater quality through existing State and Federal laws. New Federal funding authorization for the States is not required to implement the recommended Federal legislation if the five principles listed above are adopted.

The inconsistencies, which have been created by uncoordinated Federal laws impacting groundwater, are obstacles to effective groundwater quality management. If these obstacles are removed by the Federal legislation described in the ASIWPCA position, the States can conduct effective groundwater quality programs without substantial, additional Federal funding.

However, if prescriptive Federal legislation is enacted by the Congress, States will need additional Federal funding to carry out these program responsibilities.

STANDARDS

State groundwater programs need dependable criteria for assessing contaminants which affect drinking water uses--both in terms of health and aesthetic effects. USEPA should be required to give highest priority to providing those criteria and risk assessments in an expeditious manner. State groundwater standards developed under a new Federal law should apply equally to __all__ Federal programs including those administered under the Clean Water Act, (CWA) Resource Conservation and Recovery Act, (RCRA) Federal Insecticide, Fungicide and Rodenticide Act, (FIFRA) Superfund Act and Safe Drinking Water Act (SDWA).

Nearly three-fourth's of the States responding to our survey indicate that a new Federal groundwater law is needed to eliminate inconsistencies by using State-established groundwater cleanup or control standards for all Federal programs relating to groundwater. More than three-fourths of the States believe that the most effective management method for cleaning up existing groundwater quality problems and for preventing new ones would be to use ambient groundwater quality standards either alone or in combination with a classification system.

Interestingly, 45% of the States currently use groundwater classification systems and nearly 61% of the States, responding to the ASIWPCA survey, currently use numerical groundwater quality standards. In addition, 77% of the respondents believe that ambient standards, groundwater classification, or a combination thereof could be effective to prevent significant new groundwater contamination. However, States caution that these are only 2 of the many tools at their disposal (e.g. land management through siting, zoning, etc.).

TYPES OF PROBLEMS

The States support the concept of addressing groundwater contamination sources of national concern to the extent that such are significant in any given State. Our questionnaire indicated that more than 50% of the States have experienced major or moderate groundwater quality problems with:

.. improper storage and use of chemicals,
.. disposal of solid waste,
.. septic tanks, and
.. contaminants from spills.

Furthermore, more than 40% of the responding States have experienced major or moderate groundwater quality problems from use of pesticides, fertilizers, and industrial waste lagoons.

However, more that 70% of the States consider their existing State laws adequate to deal with these problems. And, the framework of ambient water quality standards and groundwater classifications over time will enhance the State programs that currently exist.

In addition, sixty-eight percent of the States responding to the ASIWPCA survey indicate that the FIFRA reauthorization should incorporate some groundwater protection activities that would be the responsibility of the States. Again, with the passage of S. 20, all Federal statutory programs would be held to the same groundwater standard.

RESEARCH

As previously mentioned, the Federal government should provide technical assistance, support research and development and disseminate information to the States. The Federal government should also have a major role in translating research into useful guidelines (technology transfer). There is a great need for increased research related to human-induced toxic contaminants.

Research, technical assistance and information dissemination on best management practices to prevent agricultural contamination is an area where the US Department of Agriculture could be of greater assistance. The States are dependent upon Federal research in order to successfully implement a myriad of environmental programs. Our ASIWPCA survey indicates that States view research as a primary role of the Federal government. Specifically, ASIWPCA members identified a variety of research needs, and provided the State perspective on which Federal agency should take the lead:

Research Subject	Lead Agency
(A) Aquifer Mapping:	USGS (58%); States (38%); USEPA (2%); Other (2%).
(B) Development of New Computer Models:	USGS (44%); USEPA (31%); States (11%); NSF (10%); Other (4%).
(C) Development of Groundwater Quality Standards:	USEPA (50%); States (50%).
(D) Sampling Protocols:	USEPA (56%); USGS (20%); States (19%); NSF (5%).
(E) Behavior of Pollutants in Groundwater:	USEPA (54%); NSF (24%); USGS (17%); States (5%).

(F) Development of Groundwater Clean-Up Technologies: USEPA (63%); NSF (18%); States (11%); Industry (7%); USGS (1%).

(G) General Groundwater Flow: USGS (63%); States (29%); NSF (4%); USEPA (4%).

(H) Risk Assessment: USEPA (57%); NSF (22%); States (19%); Other (2%).

(I) Pesticide Application Practices: USEPA (51%); States (25%); USDA (15%); NSF (7%); USGS (2%)

(J) Technology Transfer: USEPA (57%); USGS (29%); NSF (10%); Other (4%).

SUMMARY

Mr. Chairman, ASIWPCA is supportive of S. 20 because it provides the basic framework for a rational, workable and effective national groundwater program. To enhance its foundation, ASIWPCA has some suggestions which we have included in the attached marked-up version of S.20.

On behalf of the Association, we extend to you our appreciation for inviting us to appear before this Subcommittee. And, in closing, Mr. Chairman, we would ask that a copy of a recent ASIWPCA report, America's Clean Water - The States' Nonpoint Source Assessment, and the proceedings of the recent State Groundwater Technical Exchange Seminar be included as a part of the record.

Again, we appreciate your kind invitation to present the ASIWPCA testimony.

ASIWPCA
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RELATED ASIWPCA POSITIONS

REFERENCE: (Related Position) - GROUNDWATER

ASIWPCA POSITION

A. Groundwater Quality Program Purpose and Organization

1. The goal of national groundwater policy must be to protect human health and the environment by preventing and mitigating groundwater pollution wherever possible.

2. National groundwater policies must be established to avoid adverse impacts and protect existing and potential groundwater uses.

3. Existing State and Federal statutes, regulations and program responsibilities must be reviewed and amended as necessary to improve existing groundwater quality programs.

4. Regional groundwater quality criteria are needed that transcend State borders and are based on natural groundwater systems including regional geology and climatic conditions.

B. State Role

1. State governments must continue to be fully responsible for management of groundwater quality and quantity. They must also continue to resolve groundwater quality and quantity policy in conjunction with local governments. Institutional arrangements should be the prerogative of the State based on unique legal, economic, and social conditions as well as regional geologic and climatic conditions controlling groundwater quality, availability and volume.

2. States should determine the degree and extent of groundwater pollution wherever possible. Their programs must consider the effect of degradation on other States' waters.

3. States should develop and maintain comprehensive groundwater quality programs, including an inventory of uses and groundwater quality criteria on a hydrogeologic basis.

4. State governments should provide adequate financial support to achieve and maintain groundwater quality programs.

C. Federal Role

1. The Federal government should provide technical assistance, support research and development, and coordinate and disseminate information to States. This should include developing and maintaining an integrated nationwide data base and computer facilities.

2. The Federal government should assist States in the review and definition of geologic and climatic conditions controlling groundwater quality and quantity. The Federal Government should maintain and expand the long-term groundwater related activities of the U.S. Geological Survey.

3. The Federal government should involve States in their activities and provide adequate financial support for State program elements addressing interstate groundwater quality. Appropriate State and Federally authorized Interstate Agencies should receive Federal funds for groundwater and aquifer protection. In carrying out management activities, these Agencies should involve local and regional entities.

4. To encourage national scientific and policy consistency, the Federal Government should provide mechanisms to translate research results into usable recommendations and guideline values for use at the States' option in their groundwater management programs.

5. The Federal government must continue to have no responsibility or authority in the management of groundwater quantity.

D. Groundwater Legislation

1. Existing Federal laws and regulations are primarily directed toward specific pollution sources such as sewage, solid waste, hazardous waste, and underground injection. These laws have not addressed groundwater in a coordinated manner and have created administrative and statutory inconsistencies. Federal legislation, which embodies the following principles, is needed to resolve these inconsistencies:

   (a) US EPA must quickly develop health-based criteria for a significant number of groundwater contaminants. Adequate funding must be appropriated so US EPA can accomplish this in a timely fashion.

   (b) The States must classify their groundwaters and adopt ambient groundwater quality standards using US EPA's criteria as guides.

(c) Upon adoption, each State's standards become the basis of clean-up or control under any Federal Program relating to protection of groundwater in the State.

(d) The States must, on a reasonable schedule, define and implement programs and activities to assure the maintenance and attainment of ambient groundwater quality standards, and minimize degradation.

(e) State groundwater programs must address groundwater contamination sources of national concern, to the extent that such sources are significant in a given State. Such programs need not be regulatory.

ADOPTED: August 1983
REVISED: August 1987

RATIONALE

Programs must be developed and enhanced to prevent and mitigate groundwater pollution. Existing Federal statutes including the CWA, SDWA, RCRA, FIFRA, and CERCLA establish differing procedures to control groundwater quality. Federal programs must be based on a more consistent set of objectives carried out through complementary processes which may be applied by States. Resolution of groundwater quality/quantity conflicts is a State responsibility. As the program progresses, an ongoing review process (including economic considerations) must be used to make revisions.

Groundwater problems do not recognize boundaries and research can be most effectively accomplished at the Federal level. The information generated should be beneficial to States but must not be mandatory given unique hydrogeologic conditions of each State and the judgments required in risk assessment and regulatory decision making.

While non-degradation of groundwater is an admirable goal, it is not a practical one. Non-degradation cannot be accomplished unless all future septic tanks, all land application systems for wastewater, and many pesticide uses are prohibited. The concept of minimizing groundwater degradation (anti-degradation) is achievable and is supported by the States.

The States are already carrying out significant activities to assess, monitor, protect, and manage groundwater quality through existing State and Federal laws. New Federal funding authorization for the States is not required to implement the recommended Federal legislation if the principles listed in Paragraph D above are strictly followed. If prescriptive Federal legislation is enacted, the States will need additional Federal funding to carry out these programs.

The inconsistancies, which have been created by uncoordinated Federal groundwater laws, are obstacles to effective groundwater quality management. If these obstacles are removed by the Federal legislation described in Paragraph D, the States can conduct effective groundwater quality programs without additional Federal funding.

RATIONALE FOR ASIWPCA's SUGGESTED CHANGES TO S.B.20

P.1, Line 9	The States must retain the responsibilities they currently have with regard to designation of uses for their waters.
P.2, Lines 5-13	Natural contamination of ground water is not an issue for national legislation. The focus must be on man-made contaminants and contamination which adversely affect human health first, and other uses of ground water second.
P.2, Line 21	The States' greatest need is criteria for the contaminants which affect public health. EPA should have no higher priorities.
P.3, Lines 7-11	Same as for P.2., Line 21.
P.3, Lines 12-13	If a State needs criteria for contaminants impacting uses other than drinking water, that State may develop such. Again, EPA's priorities must not be diverted from developing criteria to protect human health.
P.3, Lines 14-21	Language is overly prescriptive and assumes EPA must be ordered to do something which makes sense, when simply asking EPA to do so would suffice.
P.5, Line 5	Six months is an excessive length of time for an action as simple as appointing a panel. The criteria are so urgently needed that all unnecessary delays must be eliminated.
P.5, Lines 17 & 19	Having a State panel with membership from each EPA Region will assure better and fairer representation for the States.
P.6, Lines 9, 11-13	Again, the national priority must focus on public health (drinking water). A State may address other uses with standards if other uses are important to that State.
P.6, Lines 13-14	Non-degradation standards are impractical and unattainable except in areas that are not presently farmed or developed and will never be farmed or developed. Adequate protection will be afforded through anti-degradation standards.
P.6, Lines 21-22	Same as for P.2, Line 21.
P.7, Lines 9-10	Areas with specific background quality are also legitimate areas to be designated as special ground water systems.
P.7, Line 14	Numerical standards may not be appropriate or necessary for some special ground water systems. The flexibility not to use numerical criteria should be maintained.
P.7, Lines 17-18	Same as for P.7, Lines 9-10.
P.7, Lines 21, 23-24	Examples are not needed and may tend to limit unnecessarily the use of special ground water system designations.

P.8, Lines 12, 14, 15, 17, 18	"Compliance" implies an intensive regulatory program. "Attainment" is a more positive term and is more in keeping with the fact that some ground water protection will be achieved through non-regulatory programs such as education, use of best management practices, etc.
P.9, Lines 9, 11, 17	Six months is an excessive amount of time for public comment or comment by the Administrator.
P.9, Line 14	A review every three years is a carryover from the Clean Water Act. Situations do not change so rapidly as to justify a triennial review either for surface water or ground water quality standards Five years is certainly frequent enough; States can always review more frequently if they choose.
P.9, Line 22 through P.10, Line 25	It seems appropriate to name all Federal statutes which have programs relating to protection of ground water so there will be no questions as to intent.
P.11, Lines 1-3	The addition is to clarify intent further and is in keeping with the language on P.9, Lines 19-21.
P.11, Lines 22,25, and P.12, Lines 1-3, 5-8	Virtually every State has been conducting assessments of its ground water resources for years. In most cases, States can readily meld existing studies into assessments which will meet the requirements of Sec.6.(a). Long and complex timetables are unneeded. Guidance from EPA should be minimal, since the requirements of Sec.6.(a) are prescriptive enough, and since under ASIWPCA's proposed changes to this bill, there will be no Federal funding provided to the States.
P.11, Lines 23-24	There is no need to have the States dealing with, or answerable to, two Federal agencies on ground water programs. Such a situation does not exist in the other major Federal environmental laws. EPA may exercise its prerogative to consult with the USGS very closely on many aspects of the programs called for in this Act. EPA may send State assessments and other reports to USGS if it chooses to do so, but States should deal only with EPA.
P.12, Line 11	Same as P.11, Lines 23-24.
P.12, Lines 12, 14-16	"Management" implies control over water allocations; "protection" implies control over water quality. This Act must deal only with water quality.
P.12, Line 19	Local programs are an important and necessary element of a comprehensive ground water protection strategy in most States.
P.13, Lines 3-7	Defining how to go about attaining ground water standards is the most important element of a strategy.

P.13, Line 8	Same as P.12, Lines 12, 14-16.
P.14, Lines 16-17 and 21-22	Same as P.11, Lines 23-24.
P.15, Lines 8-9	Same as P.11, Lines 23-24.
P.15, Line 13-14	Same as P.8, Lines 12, 14, 15, 17, 18.
P.16, Line 7	Same as P.12, Lines 12, 14-16.
P.17, Lines 4-9	Same P.9, Line 22 through P.10, Line 25.
P.17, Lines 14-16	Some facilities or activities are designed to discharge, such as septic tank tile fields and wastewater spray irrigation systems. However, it is entirely appropriate to prohibit discharges from some other types of facilities or activities.
P.17, Lines 17-21	Guidance is not needed, and may only delay the preparation and submittal of protection programs by the States. The language of Sec.9 is sufficiently prescriptive to serve as guidance.
P.18, Lines 8, 10	Six months is an excessive amount of time for comment by the public and the Administrator.
P.19, Line 1 through P.21, Line 15	Virtually every State has been conducting ground water planning assessments, monitoring, and protection activities for years. These activities are currently funded. Existing Federal and State statutes provide for a considerable amount of ground water protection. Since most States can comply with this Act without starting up major new activities which require significant funding, and since the States are cognizant and supportive of the need to balance the Federal budget, ASIWPCA recommends no Federal funding to the States for implementation of this Act.
P.21, Lines 16-25	Since EPA has existing funded staff dealing with ground water protection programs, and since the responsibilities of EPA under this Act are minimal aside from development of criteria under Sec.4, EPA should be funded only for the work it needs to conduct under Sec.4. Since this work is to be completed within 30 months of the date of enactment, funding is needed only in the first three fiscal years after enactment.
P.22, Lines 1-5	This language is needed to assure that the Act does not imply or create any involvement with regulation of water use or allocation of water rights.

S.20

A BILL

To provide for the protection of ground water through State standards, planning, and protection programs.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SHORT TITLE

SECTION 1. This Act may be cited as the "Ground Water Protection Act of 1987".

DECLARATION OF POLICY

SEC.2. It is the policy of the United States to protect the quality of ground water resources for drinking and other uses as determined by the States.

DEFINITIONS

SEC. 3. For purposes of this Act -

(1) the term "Administrator" means the Administrator of the Environmental Protection Agency;

~~(2) the term "contaminant" means any manmade or natural physical, chemical, biological, or radiological substance or matter in ground water; and~~

(2) the term "contaminant" means any substance which causes contamination; and

(3) the term "contamination" means an impairment of the quality of ground water to a degree which creates a hazard to the public health or which otherwise renders the ground water unusable; and

~~(3)~~(4) the term "State" means the 50 States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, the Northern Mariana Islands, American Samoa, and the Trust Territory of the Pacific Islands.

GROUND WATER QUALITY CRITERIA

SEC. 4. (a) ESTABLISHMENT OF CRITERIA. - (1) The Administrator shall establish criteria for ground water quality with respect to those contaminants affecting public health and found in ground water. Such criteria shall reflect the latest scientific knowledge on -

(A) the physical, chemical, biological, and radiological properties of the contaminant;

(B) the association of the contaminant with various sources of ground water contamination; and

(C) existing and needed research relating to the contaminant.

(2) The criteria established under this subsection shall include an analysis of the risk posed by the contaminant to human health ~~and the environment at various concentrations~~ in ground water, ~~and with respect to various uses of the water. Such analysis for each contaminant shall include a comparison of the risks posed by such contaminant to risks posed by other ground water contaminants.~~

(3) The States may develop criteria for contaminants which impact other uses.

~~(b) FORMAT. The Administrator shall establish and utilize a standard format for presentation of ground water criteria. The format shall be designed to facilitate State development of ground water quality standards under section 5. The format shall include a summary of the research and analysis of the contaminant which shall be understandable to public health professionals who lack training in toxicology.~~

~~(c)~~ (b) USE OF AVAILABLE DATA AND ADDITIONAL STUDIES. -

(1) In establishing criteria under this section, the Administrator shall use, to the fullest extent practicable, any data or analysis developed, or planned to be

developed, by the Agency for Toxic Substances and Disease Registry.

(2) In establishing the criteria under this section the Administrator shall consider criteria, data, and analyses developed pursuant to the Federal Water Pollution Control Act, title XIV of the Public Health Service Act (commonly referred to as the Safe Drinking Water Act), and the Toxic Substances Control Act.

(3) The Administrator shall conduct studies to the extent necessary to establish criteria under this section. Such studies may be conducted in conjunction with the Agency for Toxic Substances and Disease Registry. The Administrator may use the authorities of sections 4 and 8 of the Toxic Substances Control Act to gather data necessary to establish criteria under this section.

~~(d)~~ (c) TIMETABLE FOR ESTABLISHING CRITERIA. - (1) The Administrator shall establish criteria under this section for not less than 50 high priority contaminants within 18 months after the date of the enactment of this Act.

(2) The Administrator shall establish criteria under this section for not less than 50 additional high priority contaminants within 30 months after the date of the enactment of this Act.

(3) The Administrator shall establish criteria under this section for additional contaminants on an ongoing

basis and at a rate which is consistent with the needs of the States in developing ground water quality standards under section 5.

~~(e)~~ (d) ADVISORY PANEL. - (1) The Administrator shall, within ~~6~~ 3 months after the date of the enactment of this Act, appoint a panel to advise him with respect to the implementation of this section, including (but not limited to) the contaminants for which criteria should be established, the rate at which the criteria should be established, and the quality and format of the criteria documents.

(2) The panel shall be chaired jointly by a senior official of the Environmental Protection Agency, to be selected by the Administrator, and a senior official of the Agency for Toxic Substances and Disease Registry, to be selected by the Secretary of Health and Human Services.

(3) The panel shall include not less than ~~5~~ 10 representatives of State agencies involved with ground water protection, with not less than one from each EPA Region, and representatives of other Federal agencies involved with ground water protection, as selected by the Administrator, with the concurrence of the Secretary of Health and Human Services.

~~(f)~~ (e) RESEARCH ACTIVITIES. - The Administrator shall provide for such additional research activities as he deems necessary to support the effective development and implementation of ground water standards and protection programs. The Administrator shall provide for effective coordination of ground water-related research within the Environmental Protection Agency and among other Federal agencies.

STATE GROUND WATER PROTECTION STANDARDS

SEC.5.(a) AMBIENT GROUND WATER STANDARDS . - (1) Each State shall, for drinking water uses, establish numerical standards for contaminants found in the ambient ground water. Each State may, for other water uses, establish numerical standards for contaminants found in the ambient ground water. States may establish ~~nondegradation~~ antidegradation standards for any contaminant or contaminants in the ambient ground water.

(2) Ambient ground water quality standards shall apply uniformly to all geographic areas in the State and all geological structures, unless the area or structure is designated by the State as a special ground water system under subsection (b).

(3) Ambient ground water quality standards for drinking water uses shall, except as otherwise provided in subsection (b) for special ground water systems, be at least as stringent as the primary drinking water standard established under title XIV of the Public Health Service Act

(commonly referred to as the Safe Drinking Water Act) for the particular contaminant (if such a standard has been established under such Act).

(b) STANDARDS FOR SPECIAL GROUND WATER SYSTEMS. - (1) The State may identify discrete and defined ground water systems within the State and establish special ground water quality standards for such systems.

(2) Special ground water systems may be defined, to the extent possible, by a specific background water quality, geographic area or geologic structure. The definition of such system shall be a part of the standard.

(3) Standards for special ground water systems may vary according to the specific use of the special ground water system. Such standards ~~shall be numerical and~~ shall be based on an assessment of the risks to human health and the environment inherent in such uses.

(4) Special ground water systems may include areas of background water quality, geographic areas or geologic structures associated with uses which may require more stringent standards than those established under subsection (a) ~~(such as recharge of a valuable ecosystem)~~ and uses which may require less stringent standards than those established under subsection (a) ~~(such as agriculture, waste disposal, industrial processes, and mining)~~.

(c) ESTABLISHMENT OF STANDARDS. - (1) In establishing standards under subsections (a) and (b), the State shall utilize the criteria established by the Administrator under section 4, and any other data which the State determines to be appropriate.

(2) The State shall establish standards under subsections (a) and (b) for the high priority contaminants for which the Administrator has established criteria under paragraphs (1) and (2) of section 4(d), unless the State determines that such contaminant is not found in such State, and may establish standards for any other contaminants found in the State.

(d) ~~COMPLIANCE~~ ATTAINMENT. - (1) In establishing standards under subsections (a) and (b), the State shall establish specific procedures and methods for ~~determining compliance with~~ evaluating attainment of such standards.

(2) The Administrator shall publish guidance and information describing procedures and methods for ~~determining compliance with~~ evaluating attainment of such standards within 12 months after the date of the enactment of this Act.

(e) TIMETABLE FOR ESTABLISHING STANDARDS. - (1) The State shall propose standards for ambient ground water and for any special systems for those contaminants for which criteria have been established under section 4(d)(1) within 30 months after the date of the enactment of this

Act.

(2) The State shall propose standards for ambient ground water and for any special systems for those contaminants for which criteria have been established under section 4(d)(2) within 42 months after the date of the enactment of this Act.

(3) Any ground water standards proposed by the State shall be made available for comment to the Administrator and the public for a period of ~~6 months~~ 30 days. The State shall establish final standards within 12 months after the close of such ~~6-month~~ 30 day comment period.

(4) The State shall review, revise, if necessary, and expand, if appropriate, the standards established under this section not less often than every ~~3~~ 5 years. Any proposed revisions or additions to State standards shall be made available for comment to the Administrator and the public for a period of ~~6 months~~ 30 days.

(f) STATE STANDARDS TO APPLY UNDER FEDERAL PROGRAMS. - Any standard established by the State under this section shall apply as the standard of cleanup or control under any Federal program relating to protection of ground water. ~~including (but not limited to) the Solid Waste Disposal Act and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980~~. These Federal programs include, but are not limited to all those conducted under the following Federal statutes:

(1) Clean Water Act, 33 U.S.C. §§1251 et seq.;

(2) Safe Drinking Water Act, 42 U.S.C. §§300(f) et seq.;

(3) Resource Conservation and Recovery Act, 42 U.S.C. §§5901 et seq.;

(4) Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§9601 et seq.;

(5) Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §§136 et seq.;

(6) Surface Mining Control and Reclamation Act, 30 U.S.C. §§1201 et seq.;

(7) Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.;

(8) Atomic Energy Act, 42 U.S.C. §§2011 et seq.;

(9) Coastal Zone Management Act, 16 U.S.C. §§1451 et seq.;

(10) Federal Land Policy and Management Act, 43 U.S.C. §§1701 et seq.;

(11) Hazardous Liquid Pipeline Safety Act, 49 U.S.C. §§2001 et seq.;

(12) Hazardous Materials Transportation Act, 49 U.S.C. §§1471 et seq.; and

(13) Uranium Mill Tailings Radiation Control Act 42 U.S.C. §§2014 et seq.

(g) In the event of a conflict between the implementation of the programs of the aforementioned statutes and this Act, this Act shall prevail.

GROUND WATER RESOURCE ASSESSMENT

SEC.6. (a) REQUIREMENTS. - The State shall develop an assessment of ground water resources within such State. Such assessment shall -

(1) be sufficient to characterize ground water resources for management and protection purposes;

(2) provide a baseline for future monitoring of ground water;

(3) provide a basis for identification of special use ground water systems for purposes of section 5(b), and determination of contaminants present in such systems;

(4) focus on ground water quality, but may address ground water quantity if quantity will have a substantial impact on the design of programs to protect ground water quality; and

(5) be developed in consultation with the United States Geological Survey.

(b) ~~TIMETABLE FOR ASSESSMENT~~ GUIDANCE. - (1) The Administrator ~~and the Director of the United States Geological~~ Survey shall, after consultation with the States, ~~jointly~~ issue guidance to the States describing ~~the appropriate~~ options for content and format for assessments under subsection (a) ~~within--12-months-after--the-date--of--the--enactment--of--this Act.~~

(2) The State shall complete the assessment under subsection (a) ~~within-30-months-after-the-date-of-the-enactment-of-this-Act.~~

~~(3)--Upon-completion--of--the--assessment--under--subsection-(a),--the--State~~ shall certify to the Administrator that such assessment meets the requirements of this section, and shall provide copies of the assessment to the Administrator ~~and-the-Director-of-the-United-States-Geological-Survey~~.

GROUND WATER ~~MANAGEMENT~~ PROTECTION STRATEGY

SEC.7.(a) REQUIREMENTS. - The State shall develop a ~~management~~ protection strategy with respect to ground water resources within such State. Such ~~management~~ protection strategy shall -

(1) identify a lead agency and provide an institutional framework for protection of ground water quality including appropriate local government programs,

(2) identify major sources of ground water contamination and the contaminants associated with each such source;

(3) assure coordination among Federal, State, and local agencies involved in ground water protection; and

(4) assure coordination of groundwater protection programs with surface water protection programs and with the activities of public water supply systems~~.~~; and

(5) define programs, activities, and methods to assure the attainment of ambient ground water standards.

(b) TIMETABLE FOR ~~MANAGEMENT~~ PROTECTION STRATEGY. - (1) The State shall complete the development of an initial ground water management strategy under subsection (a) within 24 months after the date of the enactment of this Act.

(2) Upon completion of such strategy development, the State shall certify to the Administrator that such strategy meets the requirements of this section, and shall provide a description of the strategy to the Administrator.

(3) The State shall annually review and, if necessary, revise the management strategy to reflect any relévant change in conditions, and shall provide a description of any revised strategy to the Administrator.

GROUNDWATER MONITORING

SEC.8.(a) REQUIREMENTS. - The State shall establish a program of monitoring with respect to ground water resources within such State. Such monitoring program shall -

(1) be capable of assessing compliance with the standards established by the State under section 5, including standards for special systems established under section 5(b);

(2) be designed to provide periodic assessments of ground water quality trends and to identify emerging or future ground water contaminants and contamination sources;

(3) establish the institutional and agency responsibilities for monitoring; and

(4) establish the methods and procedures for monitoring.

(b) TIMETABLE FOR MONITORING PROGRAM. - (1) The Administrator ~~and the Director of the United States Geological Survey~~ shall ~~jointly~~ prepare a report to Congress evaluating alternative designs for a national ground water quality data management system within 18 months after the date of the enactment of this Act.

(2) The Administrator ~~and the Director of the United States Geological Survey~~ shall ~~jointly,~~ ~~and~~ in consultation with the States, prepare a guidance document for use by States in developing ground water monitoring programs under subsection (a) within 24 months after the date of the enact-

ment of this Act.

(3) The State shall establish a ground water monitoring program under subsection (a) within 36 months after the date of the enactment of this Act.

(4) Upon the establishment of such program, the State shall certify to the Administrator that such program meets the requirements of this section, and shall provide a description of such program to the Administrator ~~and to the Director of the United States Geological Survey~~.

(c) REPORTS ON GROUND WATER QUALITY. - (1) The State shall submit to the Administrator a report which provides a summary of ground water quality and trends in the State, and which describes the status of ~~compliance with~~ attainment of the standards established under section 5, including the standards for special systems established under section 5(b), within 30 months after the date of the enactment of this Act, and biennially thereafter. The State may use the ground water resource assessment submitted under section 6 in lieu of the first report otherwise required under this subsection.

(2) The Administrator may establish reasonable requirements regarding the content and format of reports required under paragraph (1) in order to assure compatibility of data at the national level.

GROUND WATER PROTECTION PROGRAM

SEC.9.(a) REQUIREMENTS. - (1) The State shall establish a ground water protection program which is capable of assuring compliance with the State ground water standards established under section 5.

(2) The State ground water protection program shall include individual elements addressing each source of ground water contamination identified in the ~~management~~ protection strategy pursuant to section 7(a)(2).

(3) The State ground water protection program shall include program elements addressing the following sources of ground water contamination that are of national concern:

(A) solid waste disposal;

(B) hazardous waste disposal;

(C) underground storage tanks and pipes;

(D) subsurface sewage disposal;

(E) pesticide use; and

(F) underground injection.

States shall, to the extent practicable, review and assess the interactive effects of such sources.

(4) The State may waive the requirement to develop ground water protection program elements identified in paragraph (3) by an affirmative demonstration to the Administrator that the source of contamination is not significant in that State and that ground water quality standards may be attained without establishment of a program for the

identified source of contamination.

(5) The State ground water protection program may include programs established under other Federal laws, including ~~the Solid Waste Disposal Act, title XIV of the Public Health Service Act (commonly referred to as the Safe Drinking Water Act), the Federal Insecticide, Fungicide, and Rodenticide Act, and the Federal Water Pollution Control Act.~~ , but not limited to, the statutes named in Section 5(f) of this Act.

(6) The ground water protection program elements may utilize regulations, voluntary controls, education, and any other measures which the State deems necessary and appropriate to assure compliance with ground water standards pursuant to section 5, including prohibition of any ground water discharge from specified classes of facilities and activities.

~~(7) The Administrator shall, after consultation with the States, provide States with guidance concerning the design, structure, and format of State ground water programs within 12 months after the date of the enactment of this Act.~~

(b) TIMETABLE FOR ESTABLISHING PROTECTION PROGRAM. - (1) The State shall propose a ground water protection program addressing sources of contamination identified in Section 7(a)(2) within 36 months after the date of the enactment of this Act.

(2) The State shall propose a ground water protection program addressing sources of contamination identified in section 9(a)(3) within 48 months after the date of the enactment of this Act.

(3) Proposed ground water protection plans shall be made available for comment to the Administrator and the public for a period of ~~6-months~~ 30 days. The State shall establish a final ground water protection program within 6 months after the close of the ~~6-month~~ 30 day comment period.

(4) The State shall annually review and, if necessary, revise the final ground water protection program to reflect any relevant change in conditions, and shall provide a description of any such revision to the Administrator.

(c) EPA ASSESSMENT OF STATE PROGRAM. - The Administrator may conduct an assessment of a State program (or any program element thereof) developed under this section if the Administrator has reason to believe that the State program (or element) does not comply with the requirements of this section. Such assessment may include public hearings. The Administrator shall report the results of any such assessment, together with recommendations for needed actions, to the State within 6 months after initiating such assessment.

~~GRANTS TO STATES~~

~~SEC. 10. (a) GRANTS FOR GROUND WATER RESOURCE ASSESSMENTS.—(1) The Director of the United States Geological Survey shall make grants to States for the purpose of assisting the States in carrying out ground water resource assessments under section 6.~~

~~(2) There are authorized to be appropriated for grants under this subsection $25,000,000 for each of the first 3 fiscal years beginning after the date of the enactment of this Act.~~

~~(3) The amount appropriated for each such fiscal year for grants under this subsection shall be apportioned among the States by the Director on the basis of the geographic area of the State, the percentage of the population of the State relying on ground water for drinking water, and the need for development of ground water resource data in the State.~~

~~(4) Grants made under this subsection shall not exceed 75 percent of the costs of implementing the assessment in any fiscal year, and shall be made on the condition that non-Federal sources provide at least 25 percent of the costs of the activities receiving funding under this section.~~

~~(b) GRANTS FOR PLANNING AND PROGRAM MANAGEMENT.—(1) The Administrator shall make grants to States for~~

~~the purpose of assisting the States in the implementation of sections 5, 7, 8, and 9 of this Act.~~

~~(2) There are authorized to be appropriated for grants under this subsection $50,000,000 for each of the first 5 fiscal years beginning after the date of the enactment of this Act.~~

~~(3) The amount appropriated for each such fiscal year for grants under this subsection shall be apportioned among the States by the Administrator on the basis of the geographic area of the State, the percentage of the population relying on ground water for drinking water, and the extent and seriousness of ground water contamination in such State. The Administrator shall establish a minimum grant amount in order to assure that each State has sufficient grant assistance to develop an adequate ground water program.~~

~~(4) Grants made under this subsection must be matched by the State on a dollar-for-dollar basis with State funds to be used in carrying out sections 5, 7, 8, and 9.~~

~~(c) LIMITATIONS ON GRANTS. (1) States may use funds from grants made pursuant to this section for financial assistance to persons only to the extent that such assistance is related to the costs of demonstration projects.~~

~~(2) No grant shall be made to a State under this section unless the Administrator determines, on the basis~~

~~of-information-provided-by-the-State-and-from-other-relevant sources,--that--the--State--is--implementing--the--provisions of-this-Act-satisfactorily.~~

~~(3)---The--Administrator--may--request--such--information, data,--and--reports--as--he--may--deem--necessary--to--make--the determination--of--continuing--eligibility--for--grants--under this-section.~~

GENERAL AUTHORIZATION

SEC. ~~11~~ 10. ~~(a)---GRANTS.-----There--are--authorized--to be-appropriated-for-grants-under-section-10~~

~~(1)--$75,000,000--for--each--of--the--first--3-fiscal years--beginning--after--the--date--of--the--enactment--of this-Act;-and-~~

~~(2)-$50,000,000-for-each-of-the-following-2-fiscal years.~~

~~(b)~~ ADMINISTRATIVE COSTS. - There are authorized to be appropriated to the Environmental Protection Agency for administrative costs of implementing the activities required in Section 4 of this Act ~~$25,000,000--for--each of-the-first-5-fiscal-years~~ $10.000.000 for the first fiscal year. $10.000.000 for the second fiscal year. and $5.000.000 for the third fiscal year. beginning after the date of the enactment of this Act. These funds are supplemental to any funds provided to the Environmental Protection Agency under the statutes named in Sec.5(f) .

WATER RIGHTS

Sec.11. Nothing herein shall diminish, lessen, or otherwise modify State authority to regulate water use and allocate water rights. Nothing herein shall authorize the impairment of existing water rights.

Testimony of Support of S. 1992, 100th Congress, 1st Session
John M. Harkin
University of Wisconsin, Madison, WI 53706

I am a professor at the University of Wisconsin-Madison with joint appointments in the Department of Soil Science and the Water Resources Center. I am also Associate Director of the U.W.-Madison Environmental Toxicology Center and a faculty member in the U.W.-Madison Water Chemistry Program. By training I am an organic chemist/biochemist. Through the nature of my appointments and research and teaching, I have been heavily involved with environmental problems and policy in Wisconsin and other states. Many of my activities for the past 15 years have been directed toward groundwater quality and its protection.

My experiences in Wisconsin and other states underscore the pressing need for improved intergovernmental and interagency cooperation to foster the development and implementation of uniform, prudent policy to maintain the quality and availability of groundwater nationwide. S. 1992 addresses this need at a national level in a manner which promises to pre-empt many of the difficulties, controversies and duplications of effort which Wisconsin has experienced at the state level.

The importance of groundwater as a national resource need hardly be emphasized. Aquifers in the USA are estimated to contain 16 times as much freshwater as the Great Lakes, the largest body of freshwater in the world. Most groundwater is of high quality but more and more incidences of contamination by chemical and gasoline spills, underground storage tank leakage, and pesticide residue, salinity and landfill leachate intrusion are leading to localized quality deterioration. Simultaneously regional overuse is leading to depletion of supplies in some areas. Aquifers do not conform to state boundaries or political jurisdictions so that a higher order of coordination and collaboration is needed to ensure our ability to address emerging problems in groundwater quality and supply protection.

Wisconsin was the first state in the Nation to introduce comprehensive groundwater protection legislation (1983 Wisconsin Act 410). This so-called "Groundwater Bill" introduced the concept of a two-tiered system of groundwater standards to protect groundwater quality: enforcement standards (ES) were contaminant levels which, if exceeded, would of necessity trigger regulatory action by the appropriate state agency to remedy the situation and prevent its recurrence; preventive action levels (PALs) were fractions of enforcement standards (50% for acutely toxic, 20% for chronically toxic and 10% for carcinogenic substances) which would serve as a warning flag to the appropriate state agency to take measures to prevent further quality deterioration that might lead to exceedance of the enforcement standard. The Wisconsin Department of Natural Resources (WDNR) was designated as the lead agency to implement the legislation. All other state agencies were directed to supply to the WDNR a listing of materials under their purview which might be regarded as potential groundwater contaminants. For example, the Wisconsin Department of Transportation would be responsible for underground gasoline storage tanks and road salt, the Wisconsin Department of Agriculture, Trade and Consumer Protection, for fertilizers (nitrates) and pesticides, and the Wisconsin Department of Industry, Labor and Human Relations for materials subjected to onsite waste disposal through septic systems. The Groundwater Bill prescribed the use of federally promulgated standards, where available, as enforcement standards, e.g. the Public Health Service/Environmental Protection Agency guideline of 10 milligrams per liter (mg/L) of nitrate-nitrogen. However, this directive already created problems because many Federal Government "numbers" vary from agency to agency and even from office to office within one agency. For example, some values for tolerable pesticide residue concentrations vary between the FDA and EPA, or between the Office of Pesticide Programs and the Office of Drinking Water within EPA. Moreover, many "federal numbers" are not firm standards, but merely suggested or recommended values offered to provide guidance to states in relation to human or environmental health concerns, not as a basis for groundwater protection actions.

In the absence of a "federal number" the directives of Wisconsin's Groundwater Bill became more complicated: Act 410 prescribed that in such instances WDNR must request the Division of Health (DOH) in the Wisconsin Department of Health and Social Services to generate an ES and PAL for each substance of concern identified by other state agencies. It then became the responsibility of WDNR to codify and enforce the numbers generated by DOH. This situation created much consternation among the agencies, industrial, agricultural and environmental groups, and the general public in Wisconsin.

The incident which provoked generation of the Groundwater Bill in Wisconsin was the intrusion of residues of the systemic insecticide aldicarb

(Union Carbide's Temik®) into groundwater below irrigated potato fields in the central sand plain of Wisconsin. Several U.W. scientists, including myself, had conducted research into groundwater contamination by aldicarb and other materials. However, our advice was not solicited during creation of the Groundwater Bill and testimony we submitted at hearings went unheeded. By and large, the legislation was designed as if every groundwater contaminant behaved exactly like aldicarb and as if the ramifications surrounding all contamination incidents reflected a situation similar to that with aldicarb. With aldicarb, a federal number (10 micrograms per liter or parts per billion) was available for use as an enforcement standard, only a few potato farmers were impacted, and alternative insecticides were available for use in areas where a moratorium on aldicarb applications was instated. When attention was turned to other pesticides, e.g. alachlor (Monsanto's Lasso® corn herbicide), metolachlor (Ciba-Geigy's Dual® corn herbicide), atrazine (Ciba-Geigy's corn herbicide Aatrex®), or cyanazine (Shell Chemical/DuPont's corn herbicide Bladex®), no federal numbers were available, and the numbers generated by DOH were so low--e.g. an ES of 150 and a PAL of 15 nanograms per liter or parts per trillion for Lasso--that all these products would have been essentially outlawed in Wisconsin! No good alternatives were available, and tens of thousands of farmers would have been impacted. When WDNR held hearings on the proposed standards, hundreds of farmers appeared at each venue in opposition. At a hearing in Madison, a representative of Environmental Decade was the only member of the public who spoke in favor of the standards. WDNR did not approve the proposed standards; the matter is still pending.

Had the DOH numbers been codified and enforced, results would have been disasterous for Wisconsin farmers, who are already suffering from the general depression in the agricultural economy, the reductions in dairy price support, etc. These rules would have placed Wisconsin farmers at a serious competitive disadvantage compared to their counterparts in neighboring states, whose use of agrichemicals would not have been subject to bans or moratoria because of traces of herbicide residues in groundwater. Stringent application of the Wisconsin law could even lead to prohibition of nitrogen fertilizer use in many agricultural areas, where standards for nitrate in groundwater have been exceeded. No state agency has so far been willing to touch this political hot potato!

Similar problems occur in other areas which impinge upon groundwater quality and in which my research has been involved. A major issue is the design, siting, construction, and regulation of onsite wastewater disposal systems, conventionally septic tank/soil drainfield systems. Sanitary standards, regulations and enforcement vary widely from state to state and from county to county within individual states. Wisconsin has an excellent but expensive sanitary code. Other states I have visited and worked in have codes which are so lax that groundwater contamination and its attendant health risks are rampant.

S. 1992 provides mechanisms for interactions among federal agencies and between Federal Government and state agencies that would help to eliminate crass differences in standards, standard setting procedures, and development and application of groundwater policy. S. 1992 also envisages the creation of an Advisory Committee to provide guidance to the Interagency Committee designed to implement the proposed legislation. The Advisory Committee will ensure Federal agency awareness of state problems and responsibilities in the groundwater area and also facilitate more equitable implementation of groundwater policy nationwide.

Wisconsin's Groundwater Bill created a Coordinating Council of State Agencies intended to improve interworkings of the state agencies in implementing this statewide law. The original bill did not include a research component nor an advisory committee. The Wisconsin legislature has since recognized these deficiencies in the initial legislation and has since taken steps to create a program of research to be conducted through the University of Wisconsin system and an advisory committee to help develop appropriate research priorities. This research will be coordinated through the U.W.-Madison Water Resources Center.

The Water Resources Center is one of a national network of 56 Water Research Institutes (1 each per State and U.S. possession) funded in part through the Department of the Interior; the federal portion of the program is presently administered through the U.S. Geological Survey. Many WRIs are involved in groundwater research, education and technology transfer. The WRI system provides an excellent conduit for information on groundwater data and groundwater policy among States and between the Federal Government and the States. The WRIs have a National Association of Water Institute Directors (NAWID). Consideration might be given to expansion of the S. 1992 Advisory

Council to include one or more representatives from NAWID. The Water Institute Directors are usually more conversant with groundwater quality and state and federal water policy issues that the personnel from State and local governments presently proposed as members of the S. 1992 Advisory Committee.

Currently, over two dozen federal agencies and offices are responsible for some aspect of groundwater protection under a variety of federal laws. I envisage that S. 1992 will provide a major mechanism to ensure better interaction of federal agencies involved in groundwater issues and improve the generation of prudent uniform standards for practical groundwater protection. Improved interaction of federal and state agencies will also lead to better and more uniform application of appropriate groundwater policies, so that continued adequate reserves of high-quality groundwater to meet the needs for the Nation's drinking water supplies and agricultural and industrial use can be assured at reasonable expense.

STATEMENT OF

THE NATIONAL COAL ASSOCIATION

BEFORE THE

COMMITTEE ON GOVERNMENTAL AFFAIRS
SUBCOMMITTEE ON GOVERNMENT EFFICIENCY, FEDERALISM AND
THE DISTRICT OF COLUMBIA

May 18, 1988

NCA is a trade association comprised of the nation's coal mining companies and ancillary service industries. Our member companies are actively involved in coal extraction, utilizing all of the standard mining methods and practices as they apply to the various types and occurrences of coal within the United States. Mining operations can affect ground water and, as a consequence, legislation on ground water protection may influence how (or whether) these mining operations are conducted.

NCA actively supports a ground water protection strategy that is based on a multi-use concept featuring state implementation with the Federal role limited to research, technical support, education, and financial assistance. Consistent with this position, NCA is opposed to enactment of a comprehensive Federal ground water protection measure (e.g. S.20 or S.2091) and research bills which are clearly intended as a prelude to Federal ground water regulations (e.g. S.1105). NCA can, however, embrace the enhanced coordination, research, and technical support programs envisioned by H.R. 791 and S.1992.

There are a number of activities which affect ground water quality while providing a needed benefit to society. All natural resource recovery activities can affect ground water quality. These include farming, forestry, mining, oil and gas production, and even ground water withdrawal itself. For example, mineral extraction may alter the chemical composition of the overlying strata, thus affecting the quality of the aquifer's recharge waters through percolation and leaching. Moreover, in many instances the coal resource, which is extracted, is the aquifer material itself.

The very act of mining modifies the ground water system around the mine. The most obvious effect is that ground water flows into the mine. This causes changes in the level of ground water in the aquifer. Mining also breaks up the rocks which contain the minerals. Fresh rock surfaces are exposed to the weathering process. Ground water passing over this broken rock can dissolve certain components of the rock as well as any weathering products.

These consequences of mining are unavoidable. We cannot prevent ground water from entering the mine, nor can we prevent the dissolution of soluble components of the rock. This may limit the use of the ground water in and around a mine. Clearly, we must minimize our impact to ground water, (and do so already via strict adherence to the requirements of the Surface Mining Control and Reclamation Act, Clean Water Act, Safe Drinking Water Act, Toxic Substances Control Act, state and local statutes and ordinances) but just as clearly this nation cannot exist, as we know, without mining.

It must also be noted, however, that coal mining operations take place on a relatively small percentage of U.S. land area. For example, as of the end of 1986, the cumulative total of acreage permitted for coal mining operations - both surface and underground - was 3.4 million acres. Furthermore, while this amount represents land with potential for mining the reality is a vast amount of this area, is not and never will be mined. Inclusion of significant acreage in the "permit area" is required for buffer areas (i.e. undisturbed) and other activities which have little or no impact on ground water. Thus, actual land area "disturbed" by coal operations in any given year is significantly less than the 3.4 million acre figure referenced above. This number, though inflated, may still be used to show the relative insignificance of the potential land disturbance vis-a-vis potential extent of ground water impact of coal mining. This number represents only 1.1% of the 310 million acres of U.S. land currently under active crop and fruit orchard production or only .16% of the U.S. total surface area of roughly 2.24 billion acres.

Although representing a relatively small acreage, the potential for coal mining operations to affect ground water resources has long been recognized. This recognition and a prevailing concern to minimize any such impacts were manifested into the provisions of the Surface Mining Control and Reclamation Act. For over a decade, all surface and underground coal mines have been required to obtain a permit. To be granted a permit, a lengthy and in-depth permit application process must be followed, including comprehensive identification of ground water resources and requirements that mining operations minimize effects of mining on the resource. Attachment A provides a summary of the provisions of SMCRA which directly or indirectly serve to protect ground water. Furthermore, coal mining operations also must comply with provisions and regulations of the Clean Water Act, Toxic Substances Control Act, Safe Drinking Water Act, Federal Insecticide Fungicide and Rodenticide Act, Comprehensive Environmental Response, Compensation and Liability Act, and other Federal and state environmental statutes.

Answers to Subcommittee Groundwater Questionnaire

1. A more comprehensive federal ground water protection policy and better interagency and intergovernmental coordination have often been urged, do you agree that S. 1992 addresses those needs?

> NCA believes that current Federal statutes are adequate to address the sources of contamination which the Federal government should be addressing. Furthermore, most state and local governments are making substantial progress in controlling potential sources of contaminants through siting and technology requirements, land use controls, and best managment practices. The Association of State and Interstate Water Pollution Control Administrators' has testified to the efficacy and extent of state ground water protection and management activities documenting that "77% of the states have comprehensive ground water quality regulatory systems or protection strategies in place," and the remaining 23% will have such systems or strategies in place before the end of 1988.
>
> It is important to recognize that states already have a broad base of state legislation, regulation, and monitoring data with which to manage groundwater quality. As is evident by the existence of over a dozen Federal statutes which protect groundwater, and the state activities mentioned above, the programatic elements are in place to protect and manage groundwater resources both at the state and Federal level.
> For these reasons, and many others, NCA opposes legislation which would implement a more comprehensive, regulatory based, federal Ground water Protection program. S. 1992 correctly avoids creating such an unnecessary federal regulatory program.
>
> To enhance ongoing federal and state activities which seek to manage and protect ground water, NCA believes better interagency and intergovernmental coordination is essential. The provisions of S. 1992 are consistant with this philosophy and would facilitate more effective

implementation of existing state and Federal statutory authority. Importantly, the committee structure envisioned by S. 1992 clearly recognizes and preserves the primary role states have in managing and protecting ground water while acknowledging that the proper federal role is providing states with technical assistance, information, and research and development program support.

2. Would comprehensive federal groundwater protection policy and the accompanying federal oversight and guidance dilute or reinforce existing state and local policies?

Depending upon the specific provisions of the law, and how carefully it was crafted, a new federal statute providing for comprehensive ground water regulation and federal oversight could either dilute or reinforce existing state and local policies/programs. To the extent that federal legislation preempts or modifies pollution controls already in place (e.g. S. 2091, S. 20) and creates conflicting requirements, it could weaken present control plans and prevention policies. Further, to the extent that legislation redefines present controls without considering whether the existing laws are deficient or ineffective, new legislation could be detrimental to ground water protection. For example, several of the proposed bills (e.g. S. 20 and S. 2091) indentify mine ponds as a potential source of ground water pollution but none of the justification accompanying the bills mention the detailed controls and ground water impact evaluations already required of coal mine ponds and inpoundments under the provisions of the Surface Mining Control and Reclamation Act (SMCRA)-(See attachment "A"). Where new legislation assumes a gap but there actually is none, duplicative and conflicting requirements will result. This certainly does not serve to integrate or strengthen existing state and local policies.

New legislative mandates would require reallocation of already scarce agency resources away from programs currently protecting the environment. While states attempt to meet the mandates of a uniform federal program, significant delays in ongoing state efforts to protect ground water could result. This is not a step forward and or in the correct direction. If what is meant by "Federal Oversight" is interpreted to mean a legal requirement for federal approval of state plans, NCA opposes such a concept. It has been our experience under SMCRA that such a requirement defeats the purpose of assigning states the lead role in assessing and addressing ground water problems. The latter is the key component in a successful ground water program.

On the other hand, a research bill as HR. 791 or a coordination enhancement bill as S. 1992, would serve to increase knowledge about the nation's ground water resources and directly help to strengthen and integrate existing federal and state protection programs. Aquifer mapping, quality and quantity assessments, studies of contaminants fate and transport, and risk assessment analyses are all tasks that would complement and strengthen existing ground water protection and management programs. The framework for federal interagency coordination of such projects and for addressing much needed state technical assistance, information transfer, and research needs is adequately provided for in S. 1992.

3. If the primary responsibility for groundwater policy-making were to reside with the federal government, which agency(ies) should set it?

NCA supports a ground water protection strategy/policy that is based on a multi-use concept featuring state implementation with the federal role limited to research, technical support, education and financial assistance. The industry recognizes the need to manage groundwater in such a way as to both protect the environment and avoid unnecessary constraints on the siting and operation of coal mines. The optimum ground water program will therefore recognize the site-specific characteristics of the resource and its relative importance to society. It is inappropriate to premise ground water regulatory decisions solely on protecting all aquifers as drinking water or in their natural background condition, when the most socially beneficial use of a particular ground water formation may be for livestock watering, mineral development or industrial uses.

The impacts of ground water management decisions are generally localized and only rarely has there been significant interstate ground water pollution. To account for these facts and concerns adequately, management and protection must be vested fully in the individual states. Thus, if there is to be a national policy, it should simply be that states have the primary responsibility for ground water management and protection. If a central national goal is determined as necessary by Congress, it should be based upon minimization of impacts to ground water quality yet clearly allow states the latitude to define "minimization" generally enough to address local conditions and needs. The latter concept necessarily includes full consideration of use, value, and vulnerability of the specific ground water resource and competing yet equally beneficial resource recovery or other societal needs.

Coordination of activities or policy making should not be prejudiced by statutorily mandating a single lead agency. The creation of such could create confusion and limit the ability of agencies to carry out existing statutory missions. No one federal agency should set comprehensive ground water protection policy, primarily because no one agency has responsibility for considering all the multiple uses which society demands from the resource nor do they fully comprehend the statutory and programatic requirements of all other agencies. There are many different agencies with legislative authority and expertise in ground water, therefore it is appropriate that S. 1992 and H.R. 791 vests in the Office of the President the authority for coordinating federal government ground water activities.

4. Cite any exemplary state, local, or federal coordinated ground water management efforts which you are aware of that could serve as a model for any future coordinated federal interagency entity.

In 1986 the state of Ohio adopted a comprehensive ground water protection strategy. Under this strategy, an interagency Ground water Advisory Council was established to fulfill five functions:

1) Provide advice and direction to the General Assembly and state departments dealing with ground water.

2) Coordinate state and local agency and government activities to better manage ground water resources by avoiding conflict and duplication.

3) Facilitate liasion between government, industry, and the private sector.

4) Provide a forum for debate and problem resolution relative to ground water issues and,

5) Encourage programs to increase public awareness and knowledge of ground water resources, and its protection.

The Council's committees are meeting with great success on issues such as non-Superfund cleanup, wellhead protection, private water standards, underground storage tanks, ground water classification, and other issues that go beyond existing Federal programs and which allows the state to coordinate a total ground water protection effort. NCA believes Illinois is another example of a coal mining state doing an excellent job of coordinating of ground water programs. (Enclosed is a copy of the Ohio Ground water Protection and Management Strategy).

5. Cite any examples of the inefficiency or ineffectiveness of federal and state atempts to coordinate ground water management efforts which you are aware of that serve to illustrate the need for change along the lines envisioned by S. 1992.

In 1984 the EPA set up its Office of Ground water Protection (OGWP). Since that time, the office has published a comprehensive ground water strategy and a draft ground water classification guidance document-among other publications. Since the office lacks statutory authority, it is powerless to force other program offices to adopt their recommendations. Given the inflexibility of the work products the office has generated to date, this is not necessarily a bad thing. What is conerning, however, is that various states are adopting the recommendations contained within the ground water classification document, without giving due consideration to the state-specific ramifications-under the erroneous assumption that this is a prerequisite for federal approval of related state programs. This is particularly alarming for coal mining operations, because under the OGWP ground water classification scheme, coal mining would likely be prohibited.

The latter stems from the EPA's myopic assumption that virtually all ground water is suitable for drinking water and must be protected for this use. While actual drinking water sources must be protected-the agency must realize that ground water is a natural resource not unlike minerals/coal. In this regard, decisions must be made in the context of resource management recognizing that other uses of ground water are equally important to society.

Since the EPA OGWP does not have the authority to regulate coal mining operations (or any other industry/entity) it did not factor in impacts of the document on industry/society. When pressed on the issue, the Office simply states that it is not accountable for how states are using the document. This scenario is clearly neither efficient nor effective-and represents a fragmented and delirious approach to prudent ground water policy and protection.

The coal industry is required to complete exhaustive studies on surface and ground water systems prior to obtaining a permit to mine. (See attachment A) It has become clear in attempting to fulfill these permitting requirements of SMCRA that more interpretive studies of aquifer systems from the USGS would be useful for this and other uses. Both states and industry are hamstrung by the diversity of and lack of coordination between existing data bases and the inability to access the data on personal computers. The USGS should design a system that would make all data on ground water within a certain geographic area available to the user. NCA believes this will not only increase accessibility, but promote better data compilation - both of which are necessary for a successful groundwater management program.

ATTACHMENT A

Requirements of the Surface Mining Control and Reclamation Act of 1977

Under the Surface Mining Control and Reclamation Act (SMCRA), all surface and underground coal mines must obtain a permit. To be granted a SMCRA permit, a lengthy and in-depth permit application process must be followed. The application for a permit must include substantial and detailed geologic and environmental data in addition to a determination of the "Probable Hydrologic Consequences" (PHC) of the mining and reclamation activities -- both on and off the mine site. Specifically, Section 507(b)(11) requires:

> (11) a determination of the probable hydrologic consequences of the mining and reclamation operations, both on and off the mine site, with respect to the hydrologic regime, quantity and quality of water in surface and ground water systems including the dissolved and suspended solids under seasonal flow conditions and the collection of sufficient data for the mine site and surrounding areas so that an assessment can be made by the regulatory authority of the probable cumulative impacts of all anticipated mining in the area upon the hydrology of the area and particularly upon water availability.

Section 508 of SMCRA contains reclamation plan requirements which include a detailed description of measures to be taken during mining to assure the protection of surface and ground water systems. Specifically, Section 508(a)(13) requires -

> . . .a detailed description of the measures to be taken during the mining and reclamation process to assure the protection of:
>
> (A) the quality of surface and ground water systems, both on and off-site, from adverse effects of the mining and reclamation process;
>
> (B) the rights of present users of such water; and
> (C) the quantity of surface and ground water systems both on and off-site, from adverse effects of the mining and reclamation process or to provide alternative sources of water where such protection of quantity cannot be assured;

In addition to the above requirements for permit approval, Section 510 (b)(3) of SMCRA provides that the permit cannot be granted unless -

> (3) the assessment of the probable cumulative impact of all anticipated mining in the area on the hydrologic balance specified in Section 507(b) has been made by the regulatory authority and the proposed operation thereof has been designed to prevent material damage to hydrologic balance outside the permit area;

Comprehensive environmental protection standards are contained in Section 515 of SMCRA (Section 516 for underground mines). Section 515 (b)(10) provides for ground water protection as set forth below:

> (10) Minimize the disturbances to the prevailing hydrologic balance at the mine site and in associated offsite areas and to the quality and quantity of water in surface and ground water systems both during and after surface coal mining operations and during reclamation by -
>
> (A) avoiding acid or other toxic mine drainage by such measures as, but not limited to -
>
> (i) preventing or removing water from contact with toxic producing deposits;
>
> (ii) treating drainage to reduce toxic content which adversely affects downstream water upon being released to water courses;
>
> (iii) casing, sealing, or otherwise managing boreholes, shafts, and wells and keep acid or other toxic drainage from entering ground and surface waters. . . .
>
> (D) restoring recharge capacity of the mined area to approximate premining conditions;

Extraordinary protections are afforded to "Alluvial Valley Floors" defined in Section 701(1) of SMCRA as:

> . . .The unconsolidated stream laid deposits holding streams where water availability is sufficient for sub-irrigation or flood irrigation agricultural activities. . . .

For instance, Section 510(b)(5) provides:

> The proposed surface coal mining operation if located west of the 100th meridian west longitude would -
>
> (A) not interrupt, discontinue, or preclude farming on alluvial valley floors that are irrigated or naturally sub-irrigated. . .
>
> (B) not materially damage the quantity or quality of water in surface or underground water systems that supply these valley floors. . . .

Moreover, Section 515 (b) (10) (F) provides for

> (F) preserving throughout the mining and reclamation process the essential hydrologic functions of the alluvial valley floors in the arid and semi-arid areas of the country;

Operations currently mining in such areas, as well as many others, are required to install sophisticated monitoring systems to assure compliance with the above provisions. Furthermore, SMCRA provides for the protection of fish and wildlife resources and habitats, including surface and ground water related values. Section 515 (b) (24) and

Section 516 (b) (11) of the SMCRA require surface and underground coal mining operations -

> To the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values, and achieve improvement of such resources where practicable.

In addition, Section 515 (b) (2) of the Act requires that the operator restore mined land:

> ...to a condition capable of supporting the uses which it was capable of supporting prior to mining or higher or better uses of which there is reasonable likelihood, so long as such use or uses do not present any actual or probable threat of water diminution or pollution. . . .

If these examples are not enough to establish the fact that SMCRA permitting requirements adequately consider and protect ground water and related resources during and subsequent to coal extraction, there are additional safeguards contained within SMCRA. The most significant to note is Section 522 (a)(3) which establishes a procedure for designating areas unsuitable for coal mining. Among other things, grounds for making the determination include that such operations will -

> (A) be incompatible with existing state or local land use plans or programs; or
>
> (B) affect fragile or historic lands in which such operations could result in significant damage to important historic, cultural, scientific and aesthetic values and natural systems, or
> (C) affect renewable resource lands in which such operations could result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products, and such lands to include aquifers and aquifer recharge areas; or . . . .(emphasis added)

As an additional mechanism to assure environmentally sound mining practices and reclamation activities, Section 509 requires substantial performance bonds be filed, prior to permit issuance;

". . .payable, as appropriate, to the United States or to the state, and conditional upon faithful performance of all the requirements of the Act."

The amount of the bond, which in some cases is tens to hundreds of millions of dollars, depends upon the reclamation requirements of the approved permit and;

> "shall reflect the probable difficulty of reclamation giving consideration to such factors as topography, geology of the sight, hydrology, and revegetation potential. . . ." (emphasis added)

For pre-SMCRA coal mining sites which were abandoned (i.e. left in an environmentally unsound fashion), a trust fund known as the Abandoned Mine Reclamation Fund was created. This trust is funded by a reclamation fee, applicable to all coal mining operations subject to SMCRA, in the amount of:

> "35 cents per ton of coal produced by surface coal mining and 15 cents per ton of coal produced by underground mining or 10 per centum of the value of the coal at the mine. . ."

Monies from the fund are to be used for:

> (l) reclamation and restoration of land and water resources adversely affected by past coal mining, including but not limited to reclamation and restoration of abandoned surface mine areas, abandoned coal processing areas, and abandoned coal refuse disposal areas; sealing and filling abandoned deep mine entries and voids; planting of land adversely affected by past coal mining to prevent erosion and sedimentation; prevention, abatement, treatment, and control of water pollution created by coal mine drainage including restoration of stream beds, and construction and operation of water treatment plants;

As demonstrated above, coal mining operations in the United States are already required to protect ground water resources in a manner consistent with the goals of the EPA strategy and the bills currently before the congress. If the potential for long-term or irreparable damage is high, the mine will not be permitted. Moreover, mines failing to meet the requirements of the Act are subject to strict civil and/or criminal penalties, mitigation measures and, if determined to pose an imminent danger, must be closed down.

Therefore, NCA believes that only SMCRA should apply to the protection of ground water in coal mining operations rather than being subject to dual programs and an "additional step in site-specific analysis" as proposed by EPA or subject to the provisions of S. 20 or other "comprehensive" ground water bills. Federal ground water protection relative to coal mining operations should remain within the exclusive jurisdiction of the Surface Mining Control and Reclamation Act of 1977.

Beyond SMCRA, U.S. coal operations are subject to stringent requirements of the Clean Water Act. Although most view the CWA as a measure to protect only surface waters, ground and surface waters are inescapably linked. Thus cleaning/preventing contamination of one, will have a beneficial effect on the other. In this regard, it is important to note that coal mining operations are subject to many provisions of the CWA such as Section 404 "dredge and fill" provisions - and, perhaps more important, to sections 304 and 307 relative to point source effluent guidelines and protection of in-stream quality. In fact, U.S. coal mining operations have been subject to specific effluent limitations since 1977.

Coal mining operations also contributes to the CERCLA fund for cleanup of hazardous waste sites - presumably protecting ground water resources. Further, coal mining operations are subject to provisions which stem from the underground storage tank program, well-head protection program, PCB disposal requirements and other specific components of the SDWA, TSCA, FIFRA and other statutes designed to safeguard against ground water contamination.

Natural Resources
Defense Council

122 East 42nd Street
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212 949-0049

June 13, 1988

Senator John Heinz
United States Senate
277 SROB
Constitution & Delaware Avenues, N.E.
Washington, D.C. 20510

Dear Senator Heinz:

I am writing to commend ~~you and members of the Subcommittee~~ for taking an interest in our nation's groundwater resources and for introducing S. 1992. This legislation takes an important first step toward protecting groundwater by providing for needed coordination and communication among the many federal agencies whose actions have a bearing on groundwater quality.

Our country's groundwater is in urgent need of protection. Serious contamination by synthetic and inorganic chemicals occurs in every state in the nation. At least 8,000 wells nationwide have been shut down or otherwise affected by toxic chemicals according to a 1984 EPA survey. Chemicals used in agriculture particularly are causing widespread pollution. EPA has found that at least 22 pesticides contaminate groundwater in 24 states and that one in every four wells tested in certain agricultur areas is contaminated with pesticides. While there is a pleth of federal statues that touch on various aspects of groundwa pollution, no integrated federal program exists to prevent contamination and many of the groundwater polluting sources a inadequately regulated or not regulated at all. It is becoming increasingly clear that state and local regulations are not adequate alone to protect public health and the environment from groundwater pollution. Federal groundwater legislation is urgently needed.

An important aspect of a comprehensive approach to the protection of groundwater must be coordination between the many federal agencies that have jurisdiction over groundwater. We support the provisions of S. 1992 as providing for this needed coordination. However, NRDC does not believe that our groundwater resources will be protected without a comprehensive federal groundwater protection program that provides for federally-established and state-implemented controls on the sources of groundwater pollution. Comprehensive federal

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groundwater legislation is needed that would:

1. Provide for waste and source reduction requirements as a primary means of preventing groundwater contamination.

2. Contain a non-degradation goal and a long-term goal of zero discharges into groundwater.

3. Provide for the development and implementation of source controls, including best available alternative practices, for all sources of groundwater contamination.

4. Provide for federal oversight of state groundwater protection programs so as to assure uniform implementation of source controls, waste reduction goals and groundwater protection.

5. Provide for the development of minimum chemical-specific and generic groundwater protection standards to serve as a "backstop" layer of protection and assure that failures under the source control program does not endanger human health or the environment.

6. Contain provisions for additional protection for especially vulnerable areas.

7. Provide for research, data collection, and groundwater monitoring.

Of the groundwater bills introduced this year, NRDC believes that S. 2091 and S. 2092 taken together contain many of the provisions that we believe should be included in federal groundwater legislation. Further, these bills share with S. 1992 the recognition of the need for cooperation and coordination between federal agencies and states. We urge the Members of the Committee on Governmental Affairs to join Senators Dave Durenberger and Max Baucus in sponsoring this legislation.

Again we commend you for introducing S. 1992 which provides for the necessary interagency coordination which is essential in any comprehensive federal approach to protecting our nation's groundwater.

Sincerely yours,

Robin Whyatt (cg)

Robin M. Whyatt
Senior Project Scientist

U.S. Public Interest Research Group
National Association of State PIRGs

Board of Directors
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Connecticut PIRG
Florida PIRG
Massachusetts PIRG
PIRG in Michigan
Missouri PIRG
Montana PIRG
New Jersey PIRG
New York PIRG
Oregon State PIRG
Rhode Island PIRG
Washington PIRG

Statement of

Alexandra Allen
Staff Attorney

Colleen Sladkin
Staff Researcher

To the

Subcommittee on Government Efficiency,
Federalism and the District of Columbia

of the

Committee on Governmental Affairs

U.S. Senate

on S. 1992

June 14, 1988

U.S. PIRG 215 Pennsylvania Avenue S.E. Washington, D.C. 20003 (202) 546-9707

The U.S. Public Interest Research Group (U.S. PIRG) supports S. 1992 as an important element of federal government's involvement in groundwater protection. U.S. PIRG is the national lobbying office for state PIRGs around the country. PIRGs have long worked on the state and national levels for health and environmental protection in the areas of safe drinking water, pesticide regulation, clean air, and others. We appreciate the opportunitty to offer our comments on this legislation.

Groundwater is a vital national resource which contains twenty times more water than all our rivers, lakes, and streams. Over half of our citizens, some 117 million, rely on groundwater for drinking water. In addition, groundwater is directly connected with surface water, and affects the quality of our rivers and streams. Thirty percent of the flow of surface streams comes from groundwater. Hence, contaminated groundwater harms surface ecosystems in addition to poisoning underground wells.

Yet, despite the importance of the groundwater resource to human health and environmental quality, its protection has historically been ignored. Strong federal government action is desperately needed to remedy this situation. S. 1992 is a positive step in this direction.

S. 1992 directs the President to coordinate groundwater related activities conducted by federal agencies, including the collection and dissemination of information. The President is directed to establish an Interagency Committee on Groundwater Protection, with representatives from each federal agency involved in groundwater related activities, to coordinate the activites of federal agencies. An Advisory Committee on Groundwater Protection, consisting of eleven individuals representing state and local governments, is also to be established by the President.

Currently, there exists a diversity of federal and state authorities to prevent, detect, and correct groundwater contamination. EPA's Office of Solid Waste, for example, has regulatory authority over hundreds of sources of groundwater contamination, while the Bureau of Land Management has scores of sites of groundwater contamination on its properties. The Departments of Defense and Energy have contributed to numerous instances of groundwater contamination.

Despite some efforts at developing memoranda of understanding among agencies on particular issues pertaining to groundwater, there continues to be a need for coordination on a broader scale. The Interagency Committee can play a critical role in filling information gaps and coordinating action among the many federal agencies involved in groundwater protection or use.

The Advisory Committee to be established by S. 1992 bridges an important gap between federal and state efforts at groundwater protection. Too frequently, federal programs and technical assistance for groundwater protection fail to address the real needs of state and local governments who are on the 'front lines' of groundwater protection.

In addition, S. 1992 builds on H.R. 791 and offers potential for increasing its effectiveness. H.R. 791, which was passed by the House of Representatives on January 28, 1987, assigns the Secretary of Interior responsibility for collecting, analyzing, and disseminating information concerning the state of the nation's groundwater. Through the Committees of S. 1992, other federal agencies, as well as state and local officials, would help to ensure that no duplicative research efforts are undertaken, that research goals are consistent with an overall'plan for addressing state technical assistance, and that new information is quickly shared among all relevant agencies.

In endorsing S. 1992, U.S. PIRG would like to highlight the importance of ensuring that the Advisory Committee be drawn from a representative cross-section of communities and states. The Advisory Committee must necessarily include representation of those which have advanced programs of groundwater protection and those who do not, urbanized and rural areas, areas with differing hydrological settings (including confined and nonconfined aquifiers), and differing levels of resources and technical expertise.

While S. 1992 is a step in the right direction, ultimately, government protection can only be assured by national legislation that mandates practices and control steps aimed at protecting and enhancing the integrity of the groundwater resource. We cannot foresee all the ways in which groundwater will be needed by future Americans, nor can we fully understand the complex interconnections of aquifiers and surface water. Yet, we must protect present and future generations of Americans from contaminated drinking water.

U.S. PIRG strongly believes that regulations must be based primarily on source controls, rather than water quality standards. Cleanup of contaminated groundwater is extremely expensive, and in many instances impossible. Instead, protection of the groundwater resource must be in the form of prevention.

Among bills currently pending, S. 2091 and S. 2092 come closest to the goal of an effective national groundwater protection agenda. By covering a broad range of source categories, and establishing control standards, S. 2091 and S. 2092 would initiate a badly needed comprehensive approach to the protection of groundwater.

Nonetheless, we support S. 1992 as an important first step towards a comprehensive federal program for groundwater contamination regulation. S. 1992 will enhance cooperation and communication among the many federal agencies whose actions have a bearing on groundwater quality. In addition, S. 1992 rightly recognizes the critical role of local and state governments in groundwater protection efforts. We commend the Subcommittee for its efforts in producing this legislation and we look forward to working with you on to see that this proposal, and others directed at protection of the vital groundwater resource, are enacted into law.

State of Wisconsin
Department of Agriculture, Trade & Consumer Protection
Howard C. Richards
Secretary

801 West Badger Road
P.O. Box 8911
Madison, WI 53708
608 266-1721

DATE: June 13, 1988

TO: The Honorable John Heinz
U.S. Senator
SR 277
Washington, DC 20510

Attn: Anne Metcalf

FROM: Orlo R. Ehart, Executive Assistant
Wisconsin Department of Agriculture,
Trade and Consumer Protection

SUBJECT: Senate Bill 1992

The Honorable Senators John Heinz, James Sasser and William Roth are to be commended for recognizing the need to coordinate federal, state, and local groundwater programs. Senate Bill 1992 should foster better awareness of groundwater programs, goals, objectives and needs, and may therefore improve interagency and intergovernmental coordination. The bill would not necessarily ensure a fully unified groundwater protection policy, because the various agencies currently have different missions and view their responsibilities independently. Coordination will not necessarily resolve longstanding differences related to program administration. However, the bill would reduce some duplication, and would emphasize the importance of state programs by reducing federal mandates which duplicate existing state mandates.

Groundwater resources are local resources, and the federal government should recognize the prominent role which state and local governments must play in any federally mandated programs. In some cases, traditional federal oversight of environmental protection programs may stifle state program development, and may not recognize major differences in the local resources. As a result, environmental protection may suffer. The federal government must develop workable federal policy which can accommodate state or regional differences, while at the same time establishing basic federal standards of protection and oversight.

A comprehensive federal groundwater protection policy should include basic federal standards; a significant role for the states; technical assistance to state and local governments; adequate federal funding for research on key groundwater issues; and assistance in developing federal and state cooperative data bases. Educational efforts should not be ignored. Moreover, if there is to be a true partnership between federal and state agencies, the federal government must be willing to share confidential business information with the states, subject to appropriate protections. States must also have access to policy development information, technical data and assessments as they are developed internally by federal agencies, rather than as they become publicly available.

Unless significant changes in agency structures result from the creation of new groundwater offices, I do not believe a specific agency needs to be designated for groundwater policymaking. Congress itself should review existing authority and determine, with the aid of the federal agencies, what new authorities need to be created or what existing authorities need to be clarified or changed. An interagency committee on groundwater protection, such as that proposed in this bill, might be an appropriate vehicle to coordinate these federal efforts.

Although I have not analyzed the effectiveness of the Wisconsin Groundwater Coordinating Council structure as a model for federal interagency coordination, I can assure you that it has helped promote better communication on issues of concern. Wisconsin's coordinating council consists of persons having administrative and budgetary authority within the represented agencies, and also includes a public member. The council is required to provide an annual report to the legislature. The council provides a vehicle for communication on all aspects of our programs but does not interfere with each agency's regulatory responsibilities. All of these elements have proven useful within the Wisconsin state government structure.

We have frequently looked to the federal government for advice on issues relating to pesticide contamination of groundwater. The Department of Agriculture, Trade and Consumer Protection first regulated aldicarb in 1982. The Environmental Protection Agency will release its regulatory document on aldicarb later this month. If the provisions of proposed Senate Bill 1992 had been in place in 1981, we would have benefitted from the technical assistance provided.

We continually struggle to find information on many compounds, including information on migration through soil and movement in groundwater. The lack of adequate data management at the federal level makes the state's task far more difficult, and results in unnecessary duplication of effort. The federal government should be the primary source and repository of research data on pesticide compounds and that information should be readily accessible by the states.

Although not related directly to the groundwater issue, there have been instances under our pesticide program in which the Environmental Protection Agency and the state were unable to define common objectives without a liaison group to openly discuss the issues. Since the groundwater issue has even more interagency aspects associated with it, it is even more desirable to institutionalize some sort of liaison function.

Although USGS currently analyzes water taken from Wisconsin for contamination, USGS does not currently notify us of analyses which show confirmed levels of pesticide residues. Better interagency cooperation in this matter would be helpful.

Since a comprehensive groundwater federal policy does not appear to be forthcoming in this session of Congress, it is important to move forward with this legislation as a basis for better policy development.

ORE/T4/1/D8
6/13/88-3

Environmental Protection Agency 2-24-87 pA22 NYTIMES

Shifting Gears on a Water Issue

By PHILIP SHABECOFF
Special to The New York Times

WASHINGTON, Feb. 23 — Lee M. Thomas, the low-key Administrator of the Environmental Protection Agency, is doing something out of character for the Reagan Administration. He is proposing a new national environmental program.

In six years, the Administration has shunned most new regulatory programs, showing particular aversion to environmental regulation. Thus, the Administration, including the Environmental Protection Agency, has steadfastly opposed legislation to create a new national program for cleaning up and protecting the nation's underground water supplies.

Controls on ground water have been regarded as particularly sensitive because they entail controls on land use, a concept that is anathema to a Government that believes it should meddle as little as possible in the marketplace.

But now Mr. Thomas is publicly calling for Congress to establish a national groundwater protection program.

Reversing His Position

Mr. Thomas, who has been a loyal line officer of the Administration, now says that four years of studying the underground water issue while at the E.P.A. led him to reverse his position on national groundwater legislation.

Although he opposed such legislation in the past and considered water supplies a matter for states to worry about and regulate, Mr. Thomas now says he has come to feel that there must be Federal involvement in cleaning up contaminated aquifers and preventing the pollution of those still clean.

Underground water accounts for about half of the nation's drinking water supply and much of the water used for cropland irrigation.

Although the overall dimensions of the problem are still largely unknown, most scientists agree that groundwater supplies are being increasingly polluted by pesticides from farms, by toxic waste dumps and spills, by leaking underground storage tanks containing gasoline or other toxic substances and by a wide range of other contaminants.

No Overall Protection

The Clean Water Act of 1971 has slowed and in some cases rolled back the pollution of rivers, lakes and other surface waters, but there is no overall statute mandating the protection of underground water supplies.

According to Mr. Thomas, "a cumulative examination of the issues" indicates that the pollution of underground water supplies is a serious and widening national problem that can be solved only with Federal involvement.

He also says that recent developments, including a report by the National Groundwater Policy Forum, a group of public and private policymakers organized by the Conservation Foundation, a private conservation group, have convinced him that there is heavy momentum behind the drive for a national groundwater law. The forum, which included state governors, corporate executives and environmentalists, urged the Federal Government to require the states to protect their groundwater.

United Press International

Lee M. Thomas

A loyal officer now says Washington should establish 'how clean is clean.'

Several other officials in the E.P.A. say that with the White House in turmoil because of the Iran arms affair, preoccupied with economic and national security issues and giving little other policy guidance, Mr. Thomas is increasingly taking it upon himself to establish environmental policy.

They think he is also likely to move by himself to recommend action on other national environmental needs.

Mr. Thomas said in an interview that his proposal for a national groundwater policy was his own personal view and that he did not know if the White House and the Office of Management and Budget would change their accustomed approach to environmental regulation to support a groundwater law.

He added that he would take the issue up with the White House at the appropriate time.

Mr. Thomas said that in a national groundwater program, the states and local communities would still have overall responsibility for controlling the quality of the water.

But, he continued, the Federal Government must have a "dominant role" in some aspects of the program.

For one thing, he said, Washington should set overall minimum standards for the quality of groundwater. Although he opposes setting specific limits for each contaminant, the Federal Government should establish goals that, in effect, state "how clean is clean," he said.

A 'Classification' Scheme

He also said there should be a "classification" scheme to differentiate water that needed to be protected or cleaned up from water that was so badly contamined or so inaccessible that it would be a waste of money to try to control its use.

He said thought must be given to concentrating money on resources to keep clean underground water clean, rather than spending increasingly larger sums to make incrementally smaller improvements in the quality of the water.

Mr. Thomas emphasized that new national groundwater protection legislation should take the place of those parts of other environmental laws that deal with protecting underground water supplies.

They include the laws controlling pesticides, the Safe Drinking Water Act, the "superfund" law for cleaning up abandoned toxic waste dumps and the Resources Conservation and Recovery Act, which governs the handling and disposal of hazardous wastes.

Finally, he said Washington should play a strong role in research and develop ways to analyze, clean and keep clean the nation's underground water supplies.

'For a Consistent Approach'

"Groundwater reserves are valuable natural resources that should be managed through Federal legislation for a consistent approach across the country," Mr. Thomas said.

But as a "quid pro quo" for support for national groundwater legislation, he said, supporters of such legislation should not demand "the typical environmental approach" of setting rigid standards and Federal requiring permits for any discharges into groundwater.

Edwin H. Clark 2d, vice president of the Conservation Foundation, recently commented:

"Unfortunately, though groundweater is one of the country's most important resources, it remains the orphan of U.S. environmental policy. The time has come for the nation to adopt a comprehensive effort to protect and manage our groundwater."

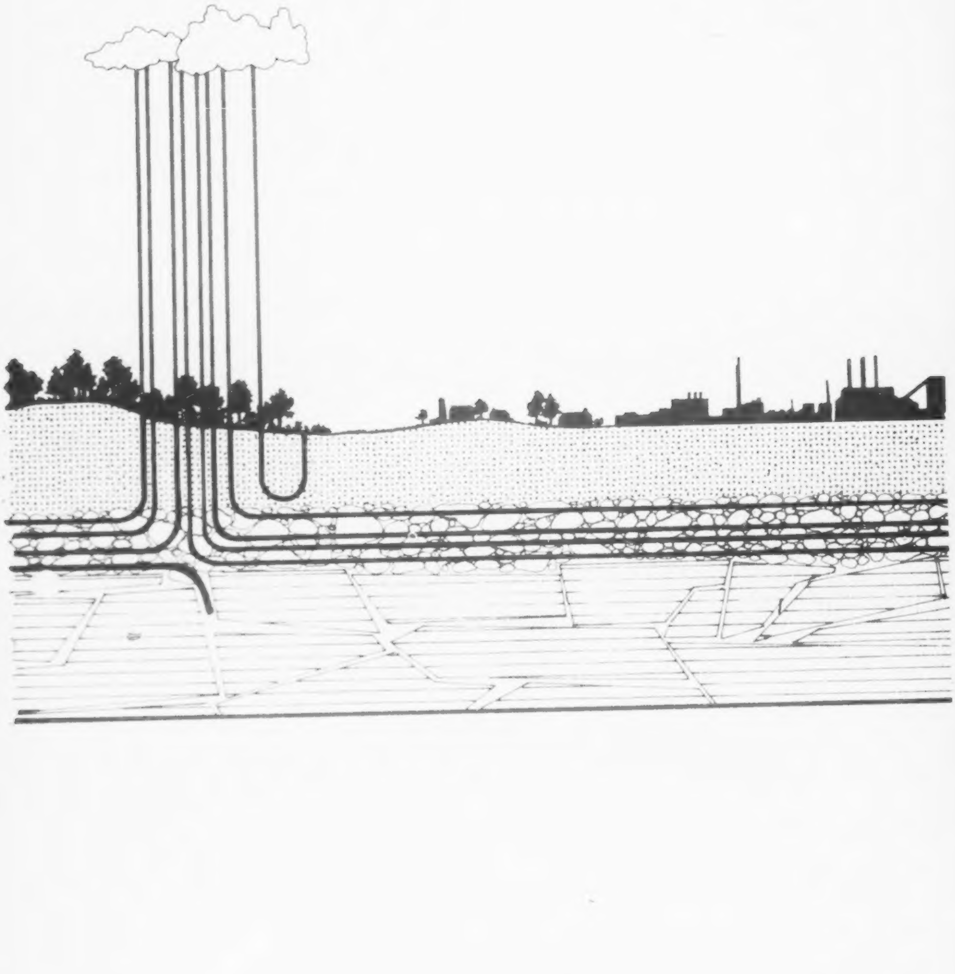
Now, whether or not the rest of the Federal Government agrees, that is just what the head of the Envrionmental Protection Agency is advocating.

United States
Environmental Protection
Agency

EPA/600/9-87/008
March 1987

Technical Assistance Directory

Ground-Water Research



EPA/600/9-87-008

GROUND-WATER RESEARCH
Technical Assistance Directory

Prepared for the

Office of Research and Development
Office of Environmental Engineering and Technology Demonstration
U.S. Environmental Protection Agency
Washington, D.C. 20460

John H. Skinner, Director
James V. Basilico, Project Officer

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Fort Washington, PA 19034
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ENVIRONMENTAL MANAGEMENT SUPPORT
9514 Midwood Road
Silver Spring, Maryland 20910
(301) 589-5318

March 27, 1987

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1. INTRODUCTION

This Directory is intended to foster communication with appropriate scientists and engineers throughout EPA's Office of Research and Development (ORD) and EPA, state, and local personnel involved in the protection and management of ground-water resources. In addition to listing ORD researchers by location and subject matter, the Directory provides brief organizational descriptions of the ground-water research programs for each office. These organizational descriptions may aid in locating assistance in areas not covered by the subject indices. Chapter 6 contains an annotated bibliography of selected ground-water publications considered to be essential references for permitting and other regulatory personnel.

ORD's ground-water research program, reflecting the information needs of EPA's operating programs, consists of five elements:

- *Source control.* Control of discharges, leaks, and other surface and underground contaminant sources to prevent ground-water contamination, including regulated hazardous waste disposal sites, unregulated dump sites, underground tanks, and accidental spills.

- *Transport and fate.* The physical movement of ground water in the saturated and unsaturated zones and also the change in ground-water quality either through natural degradation or differential transport rates.

- *Monitoring.* Well-placement and sampling of the subsurface environment to locate and characterize potential or known ground-water contamination.

- *On-site and in-situ aquifer cleanup.* Restoring a polluted aquifer through physical removal, chemical treatment, and enhanced biodegradation.

- *Technical assistance and technology transfer.* Preparation and dissemination of information about current research to decision makers, field managers, the regulated communities, and the scientific community.

EPA derives its statutory authority to protect ground water from the Clean Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), the Safe Drinking Water Act, the Resource Conservation and Recovery Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Toxic Substances Control Act, the Hazardous and Solid Waste Amendments of 1984, and the Superfund Amendments and Reauthorization Act of 1986. In response to these broad statutory mandates, in 1984 EPA's Office of Ground-Water Protection developed a Ground-Water Protection Strategy to give the Agency's program a focus and direction. It has four components:

- Short-term build-up of institutions at the state level.

- Assessment of problems that may exist from unaddressed sources of contamination including leaking storage tanks, surface impoundments, and landfills.

- Issuance of guidelines for ground-water protection and cleanup.

- Strengthening EPA's organization to improve ground-water management at the headquarters and regional levels and EPA's cooperation with Federal and state agencies.

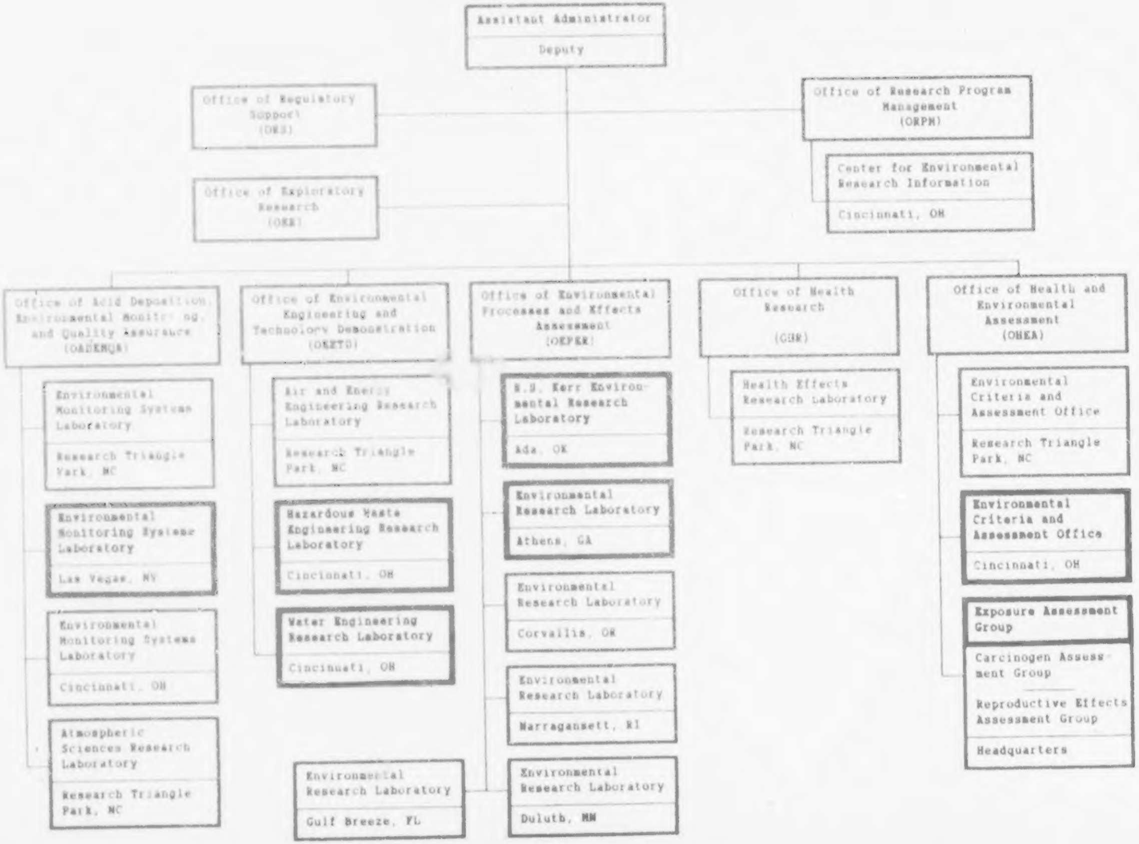
The scientists and engineers listed in this Directory conduct or manage research, development, demonstration, and technical assistance projects to support the regulatory programs of the Office of Water, the Office of Solid Waste and Emergency Response, and the Office of Pesticides and Toxic Substances. To ensure cross-office integration of research programs, ORD designated a Ground-Water Research Matrix Manager to coordinate ORD, Program Office, and Regional input on issues and priorities in the areas of prediction, monitoring, and cleanup. The Matrix Manager supplements the Water and Hazardous Waste/Superfund Research Committees, which advise the Assistant Administrator for Research and Development on research and budget priorities.

Before calling technical assistance contacts listed in this Directory, interested persons should first become familiar with relevant publications listed in Chapter 6.

2. ORD GROUND-WATER RESEARCH FACILITY DESCRIPTIONS

OFFICE OF RESEARCH AND DEVELOPMENT

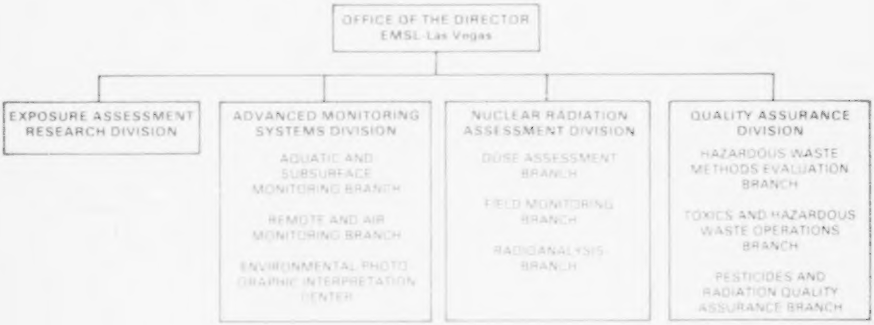
U.S. Environmental Protection Agency


Assistant Administrator
Deputy
Office of Regulatory Support (ORS)
Office of Exploratory Research (OER)
Office of Research Program Management (ORPM)
Center for Environmental Research Information
Cincinnati, OH
Office of Acid Deposition, Environmental Monitoring, and Quality Assurance (OADEMQA)
Environmental Monitoring Systems Laboratory
Research Triangle Park, NC
Environmental Monitoring Systems Laboratory
Las Vegas, NV
Environmental Monitoring Systems Laboratory
Cincinnati, OH
Atmospheric Sciences Research Laboratory
Research Triangle Park, NC
Office of Environmental Engineering and Technology Demonstration (OEETD)
Air and Energy Engineering Research Laboratory
Research Triangle Park, NC
Hazardous Waste Engineering Research Laboratory
Cincinnati, OH
Water Engineering Research Laboratory
Cincinnati, OH
Environmental Research Laboratory
Gulf Breeze, FL
Office of Environmental Processes and Effects Assessment (OEPEA)
R.S. Kerr Environmental Research Laboratory
Ada, OK
Environmental Research Laboratory
Athens, GA
Environmental Research Laboratory
Corvallis, OR
Environmental Research Laboratory
Narragansett, RI
Environmental Research Laboratory
Duluth, MN
Office of Health Research (OHR)
Health Effects Research Laboratory
Research Triangle Park, NC
Office of Health and Environmental Assessment (OHEA)
Environmental Criteria and Assessment Office
Research Triangle Park, NC
Environmental Criteria and Assessment Office
Cincinnati, OH
Exposure Assessment Group
Carcinogen Assessment Group
Reproductive Effects Assessment Group
Headquarters

Environmental Monitoring Systems Laboratory
Office of Acid Deposition, Environmental Monitoring, and Quality Assurance
U.S. Environmental Protection Agency
P.O. Box 15027, Las Vegas, Nevada 89114
FTS 545-2525, (702) 798-2525

The Aquatic and Subsurface Monitoring Branch of the Environmental Monitoring Systems Laboratory in Las Vegas (EMSL-LV) conducts ground-water monitoring research and technical assistance to support EPA operating programs. Ground-water related research includes:

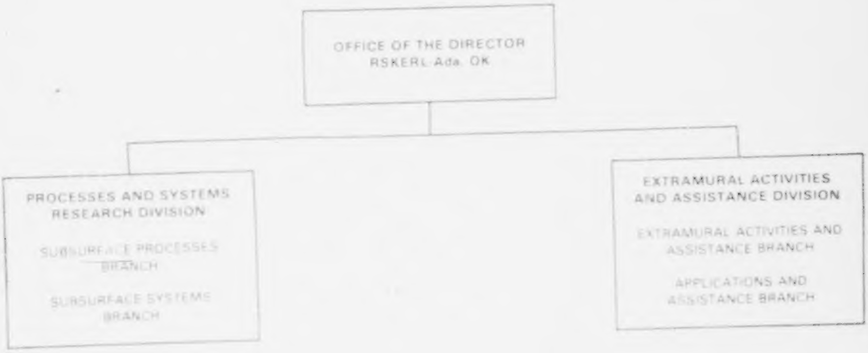
- Development, testing, and application of geophysical and geochemical techniques for detecting and mapping shallow contaminant plumes, locating abandoned wells, and mapping deeply buried contaminant plumes associated with injection wells.
- Development of advanced technologies, including laser-fluorescence spectroscopy, for *in-situ* ground-water contamination monitoring.
- Evaluation of indicator parameters for RCRA ground-water contaminant detection monitoring.
- Development of vadose zone monitoring technologies to detect percolation of pollutants from hazardous wastes.
- Evaluation of the influence of seasonal variability, well placement, spatial variability, and monitoring-well construction methods on water quality data from drinking water monitoring wells.
- Evaluation of underground storage tank external leak detection monitoring methods.
- Assistance to field teams in the use of geophysical methods in hazardous waste site investigations.


OFFICE OF THE DIRECTOR
EMSL-Las Vegas
EXPOSURE ASSESSMENT RESEARCH DIVISION
ADVANCED MONITORING SYSTEMS DIVISION
AQUATIC AND SUBSURFACE MONITORING BRANCH
REMOTE AND AIR MONITORING BRANCH
ENVIRONMENTAL PHOTOGRAPHIC INTERPRETATION CENTER
NUCLEAR RADIATION ASSESSMENT DIVISION
DOSE ASSESSMENT BRANCH
FIELD MONITORING BRANCH
RADIOANALYSIS BRANCH
QUALITY ASSURANCE DIVISION
HAZARDOUS WASTE METHODS EVALUATION BRANCH
TOXICS AND HAZARDOUS WASTE OPERATIONS BRANCH
PESTICIDES AND RADIATION QUALITY ASSURANCE BRANCH

Robert S. Kerr Environmental Research Laboratory
Office of Environmental Processes and Effects Research
U.S. Environmental Protection Agency
P.O. Box 1198, Ada, Oklahoma 74820
FTS 743-2224, (405) 332-8800

The Robert S. Kerr Environmental Research Laboratory (RSKERL) is entirely devoted to ground-water research, concentrating on studies of the transport and fate of contaminants in the subsurface, development of methodologies for protection and restoration of ground-water quality, and evaluation of the applicability and limitations of using natural soil and subsurface processes for the treatment of hazardous wastes. The core of RSKERL's program is research into the hydrologic, biotic, and abiotic processes that govern the transport and fate of contaminants in the subsurface. This provides the scientific foundation for further application-oriented research in support of EPA operating programs. To promote the immediate needs of EPA operating programs, RSKERL:

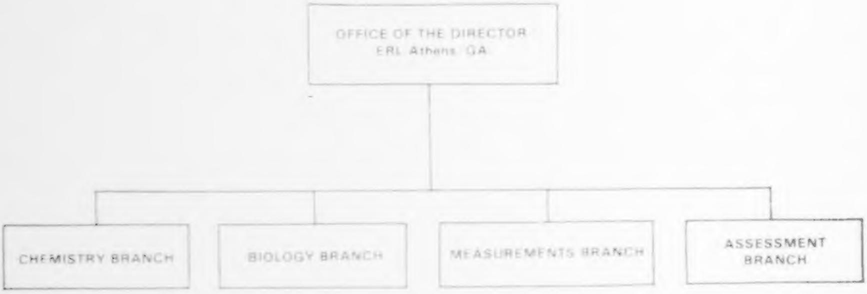
- Determines the mechanical integrity of injection wells for the Underground Injection Control Program.
- Evaluates remediation technologies for the Office of Underground Storage Tanks.
- Develops technical information for the Office of Solid Waste land treatment permitting program.
- Provides evaluations and direct technical assistance for the Superfund program.
- Transfers technology by sponsoring technical training courses, conferences, and symposia.
- Supports the operations of the International Ground-Water Modeling Center at the Holcomb Research Institute in Indianapolis, Indiana; and the Ground-Water Information Center at the National Water Well Association in Dublin, Ohio.


OFFICE OF THE DIRECTOR
RSKERL-Ada, OK
PROCESSES AND SYSTEMS RESEARCH DIVISION
SUBSURFACE PROCESSES BRANCH
SUBSURFACE SYSTEMS BRANCH
EXTRAMURAL ACTIVITIES AND ASSISTANCE DIVISION
EXTRAMURAL ACTIVITIES AND ASSISTANCE BRANCH
APPLICATIONS AND ASSISTANCE BRANCH

Environmental Research Laboratory
Office of Environmental Processes and Effects Research
U.S. Environmental Protection Agency
College Station Road, Athens, Georgia 30613
FTS 250-3134, (404) 546-3134

The Athens Environmental Research Laboratory (ERL-Athens) conducts fundamental and applied research to assess the human and environmental risks associated with pollutants in water and soil ecosystems. Ground-water related research activities include:

- Identification and characterization of significant physical, chemical, and biological processes affecting ground water to facilitate the prediction of transformation products, the rate and extent of transport, and the distribution of pesticides, hazardous wastes, and their constituents in saturated- and unsaturated-soil environments.
- Development of measurement protocols and data bases for chemical-specific properties, process-rate constants, and environmental properties that govern pollutant exposure, impact, and risk in soils and ground-water environments.
- Development of multimedia models and methods to predict the release, transport, and fate of pesticides, hazardous wastes, and toxic substances for the full range of exposure and risk assessment scenarios relevant to regulatory programs.
- Reduction of prediction uncertainties through field validations and the application of uncertainty-analysis techniques to developed models and methodologies.
- Multispectral identification of organic compounds that remain unidentified after application of conventional mass-spectrometric techniques.
- Technology transfer to communicate research results through workshops, publication of user's manuals, and distribution of user-friendly computer codes.



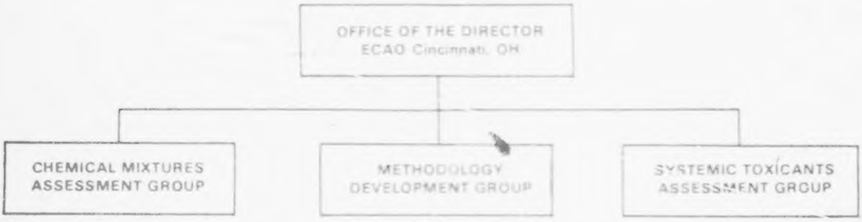
International Ground Water Modeling Center
Holcomb Research Institute, Butler University
4600 Sunset Ave., Indianapolis, Indiana 46208
(317) 283-9458

The International Ground Water Modeling Center (IGWMC), established at Holcomb Research Institute (HRI) in 1978, operates a clearinghouse for ground-water modeling software, organizes and conducts short-courses and seminars, and conducts a modeling research program to support the Center's technology transfer and educational activities. Partially supported through a Cooperative Agreement with EPA's Robert S. Kerr Environmental Research Laboratory, the Center provides assistance to federal and state agencies and private groups in organizing and conducting specially designed training programs. The Center's activities focus on:

- Collection and organization of information regarding ground-water models. Data bases compiled by the Center contain computer codes, test files, and descriptions of ground-water models.
- Distribution and support of ground-water modeling software, including model evaluation, code acquisition and implementation, code testing, preparation of documentation, and the development of code support capabilities.
- Research and development in ground-water model screening and testing, evaluation of model uses and needs, software development and improvement, and reviews.
- Training and Education to enhance the use of ground-water models by qualified personnel. The Center offers a comprehensive program of short courses, workshops, and seminars stressing principles, concepts, theories, and applications of ground-water models. Individual, computer-interactive training courses are under development.
- Brochures, reports, and newsletters intended to expand contacts within the ground-water management and research community, available on request.

Environmental Criteria and Assessment Office
Office of Health and Environmental Assessment
U.S. Environmental Protection Agency
26 W. St. Clair, Cincinnati, Ohio 45268
FTS 684-7531, (513) 569-7531

The Environmental Criteria and Assessment Office in Cincinnati (ECAO-CIN) has developed ground-water risk assessment methodologies (GRAMs) in support of the Office of Water regulations for municipal sludge landfill and land application programs (*Clean Water Act §405(d)*). The GRAMs assist in evaluating risks of human exposure from ground-water contamination resulting from various disposal practices. ECAO-CIN is also developing GRAMs for the municipal waste combustion programs of the Office of Air Quality Planning and Standards and the Office of Solid Waste.


OFFICE OF THE DIRECTOR
ECAO Cincinnati, OH
CHEMICAL MIXTURES ASSESSMENT GROUP
METHODOLOGY DEVELOPMENT GROUP
SYSTEMIC TOXICANTS ASSESSMENT GROUP

Exposure Assessment Group
Office of Health and Environmental Assessment
U.S. Environmental Protection Agency
401 M Street, S.W., Washington, D.C. 20460
FTS 475-8909, (202) 475-8909

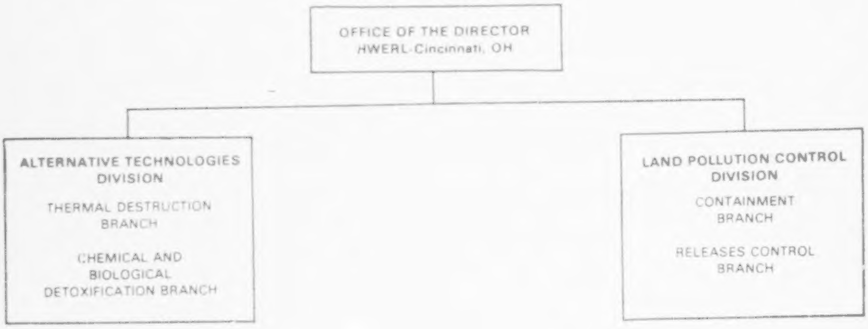
The Exposure Assessment Group (EAG) research program focuses on predicting human exposure risks from hazardous materials. Current ground-water priorities include:

- Characterization of contaminant dispersion in ground water are being evaluated using data from recent field experiments to develop a realistic approach to modeling dispersive transport in exposure assessments.
- Criteria for the selection of mathematical models that can be applied to exposure assessments are being developed. Use of the criteria will help eliminate the use of inappropriate models for estimating contaminant migration in ground water.
- A technical support document is being prepared to help select ground-water fate and transport models for quick assessments as well as for detailed analyses.
- The EAG is conducting experimental studies to investigate the migration characteristics of concentrated organics in ground water for use in developing two-phase transport models.

Hazardous Waste Engineering Research Laboratory
Office of Environmental Engineering and Technology Demonstration
U.S. Environmental Protection Agency
26 W. St. Clair, Cincinnati, Ohio 45268
FTS 684-7418, (513) 569-7418

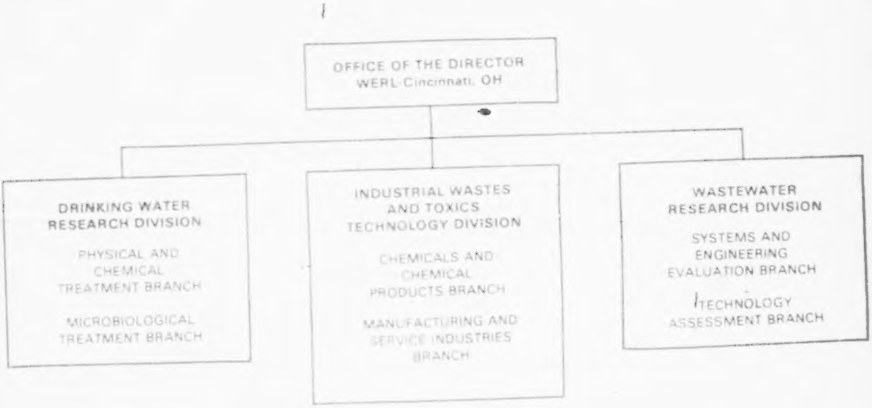
The Hazardous Waste Engineering Research Laboratory (HWERL) ground-water research programs, conducted by the Land Pollution Control Division, concentrate on developing methods to prevent the contamination of ground water by controlling surface pollutant sources. HWERL research and technical assistance programs fall into three major areas:

- Land disposal technology development including research on cover systems, waste leaching, waste solidification and stabilization, flexible membrane liners, clay soil liners, construction quality assurance and quality control, expert systems, and "Subtitle D" facility waste characterization.
- Remedial-technology development and technical assistance, including Superfund site and situation assessments, verification of remedial action design and implementation projects, development of on-site cleanup and *in-situ* treatment technologies, development of personnel protection techniques, and other technical assistance services necessary to support an increasingly field-oriented program.
- Prevention and control of hazardous releases including development of technologies to allow emergency response personnel to prevent, contain, and clean up hazardous releases, and development of technologies for the prevention and control of releases from underground storage tanks.


OFFICE OF THE DIRECTOR
HWERL-Cincinnati, OH
ALTERNATIVE TECHNOLOGIES DIVISION
THERMAL DESTRUCTION BRANCH
CHEMICAL AND BIOLOGICAL DETOXIFICATION BRANCH
LAND POLLUTION CONTROL DIVISION
CONTAINMENT BRANCH
RELEASES CONTROL BRANCH

Water Engineering Research Laboratory
Office of Environmental Engineering and Technology Demonstration
U.S. Environmental Protection Agency
26 W. St. Clair, Cincinnati, Ohio 45268
FTS 684-7951, (513) 569-7951

The Drinking Water Research Division of the Water Engineering Research Laboratory (WERL) conducts research on new or improved technologies needed for regulating the treatment of drinking water. This includes laboratory and pilot-scale studies and field-scale evaluations of processes for removing organic, inorganic, microbial, particulate, and radionuclide contaminants. Capital, operating, and maintenance costs are compiled for various unit processes and treatment trains to permit analyses of the cost-effectiveness of proposed systems. Large, centralized treatment systems, small systems, and individual point-of-entry units are analyzed.


OFFICE OF THE DIRECTOR
WERL-Cincinnati, OH
DRINKING WATER RESEARCH DIVISION
PHYSICAL AND CHEMICAL TREATMENT BRANCH
MICROBIOLOGICAL TREATMENT BRANCH
INDUSTRIAL WASTES AND TOXICS TECHNOLOGY DIVISION
CHEMICALS AND CHEMICAL PRODUCTS BRANCH
MANUFACTURING AND SERVICE INDUSTRIES BRANCH
WASTEWATER RESEARCH DIVISION
SYSTEMS AND ENGINEERING EVALUATION BRANCH
TECHNOLOGY ASSESSMENT BRANCH

3. TECHNICAL ASSISTANCE CONTACTS BY RESEARCH FACILITY

ENVIRONMENTAL MONITORING SYSTEMS LABORATORY - LAS VEGAS

Jane Denne Aquatic and Subsurface Monitoring Branch FTS 545-2655 702-798-2655	Well construction Sampling techniques
Joe D'Lugosz Aquatic and Subsurface Monitoring Branch FTS 545-2598 702-798-2598	Hydrogeology
Phil Durgin Aquatic and Subsurface Monitoring Branch FTS 545-2623 702-798-2623	Soil gas monitoring
Larry Eccles Aquatic and Subsurface Monitoring Branch FTS 545-2385 702-798-2385	Vadose zone monitoring *In-situ* monitoring methods development
Eric Koglin Aquatic and Subsurface Monitoring Branch FTS 545-2432 702-798-2432	Fractured bedrock Well placement Geographic Information System (GIS)
Aldo Mazzella Aquatic and Subsurface Monitoring Branch FTS 545-2254 702-798-2254	Geophysical methods devel/eval CERCLA site investigation Underground injection control monitoring
Charles O. Morgan Aquatic and Subsurface Monitoring Branch FTS 798-2389 702-798-2389	Hydrogeology Data acquisition
Ann Pitchford Aquatic and Subsurface Monitoring Branch FTS 545-2366 702-798-2366	Ground-water monitoring methods standardization/Quality Assurance Indicator parameters/seasonal variation Monitoring strategies
R. Rajagopal Aquatic and Subsurface Monitoring Branch FTS 545-2358 702-798-2358	Resource management and economics Mathematical modeling Ground-water quality monitoring systems
Ken Scarbrough Aquatic and Subsurface Monitoring Branch FTS 545-2645 702-798-2645	Fluid levels in underground injection wells Air Force technical support
Jeff van Ee Aquatic and Subsurface Monitoring Branch FTS 545-2367 702-798-2367	Underground storage tank external leak-detection monitoring

John Worland Aquatic and Subsurface Monitoring Branch FTS 545-2656 702-798-2656	Training, technology transfer, and project management

ROBERT S. KERR ENVIRONMENTAL RESEARCH LABORATORY

*Lowell Leach Applications and Assistance Branch FTS 743-2333 405-332-8800	Subsurface sampling Land treatment of wastewaters Underground injection Monitoring
*Leon Myers Applications and Assistance Branch FTS 743-2202 405-332-8800	Land treatment of hazardous wastes
*Marion (Dick) Scalf Applications and Assistance Branch FTS 743-2308 405-332-8800	Technical assistance Technology transfer Wellhead protection Monitoring
*Jerry Thornhill Applications and Assistance Branch FTS 743-2310 405-332-8800	Underground injection Hydrogeological investigations
Bert Bledsoe Subsurface Processes Branch FTS 743-2324 405-332-8800	Inorganic analytical chemistry
Dermont Bouchard Subsurface Processes Branch FTS 743-2321 405-332-8800	Subsurface abiotic processes
Don Clark Subsurface Processes Branch FTS 743-2311 405-332-8800	Inorganic analytical chemistry
Roger Cosby Subsurface Processes Branch FTS 743-2320 405-332-8800	Organic analytical chemistry

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*The Applications and Assistance Branch is the focus for technical assistance and technology transfer in RSKERL. When calling for technical assistance, please first contact the specialists in the Applications and Assistance Branch (listed first and starred) who will either answer your questions or direct you to the appropriate researcher.

William Dunlap Subsurface Processes Branch FTS 743-2314 405-332-8800	Transport and fate of organics
Carl Enfield Subsurface Systems Branch FTS 743-2334 405-332-8800	Contaminant transport modeling
Jerry Jones Extramural Activities and Evaluation Branch FTS 743-2251 405-332-8800	Underground storage tanks Aquifer restoration Water chemistry
Michael Henson Subsurface Processes Branch FTS 743-2420 405-332-8800	Anaerobic biotransformations Aquifer restoration
Don Kampbell Subsurface Systems Branch FTS 743-2332 405-332-8800	Soil chemistry
John Matthews Subsurface Processes Branch FTS 743-2233 405-332-8800	Toxicity testing Land treatment of hazardous wastes
James McNabb Extramural Activities & Evaluation Branch FTS 743-2216 405-332-8800	Extramural research management Aquifer Restoration
Fred Pfeffer Subsurface Systems Branch FTS 743-2305 405-332-8800	Inorganic analytical chemistry
Marvin Piwoni Subsurface Processes Branch FTS 743-2262 405-332-8800	Subsurface abiotic processes
Thomas Short Subsurface Systems Branch FTS 743-2234 405-332-8800	Contaminant transport modeling
Garmon Smith Subsurface Processes Branch FTS 743-2316 405-332-8800	Organic analytical chemistry

John Wilson Subsurface Processes Branch FTS 743-2259 405-332-8800	Subsurface microbiology *In-situ* biorestoration
Lynn Wood Subsurface Processes Branch FTS 743-2304 405-332-8800	Subsurface abiotic processes
Marylynn Yates Subsurface Processes Branch FTS 743-2236 405-332-8800	Virus transport
Scott Yates Subsurface Systems Branch FTS 743-2246 405-332-8800	Contaminant transport modeling

ENVIRONMENTAL RESEARCH LABORATORY - ATHENS

Leo V. Azarraga Chemistry Branch FTS 250-3453 404-546-3453	Fate of metals
George W. Bailey Chemistry Branch FTS 250-3307 404-546-3307	Fate of metals
David S. Brown Assessment Branch FTS 250-3310 404-546-3310	Metal speciation Transport and transformation of metals
Robert F. Carsel Assessment Branch FTS 250-3565 404-546-3565	Model applications Uncertainty analysis
J. Jackson Ellington Measurements Branch FTS 250-3197 404-546-3197	Hydrolysis rate constants Chemical transformation rate measurement
Fred F. Fong Assessment Branch FTS 250-3210 404-546-3210	Modeling multiphasic transport in porous media Numerical analysis
Chad T. Jafvert Chemistry Branch FTS 250-3349 404-546-3349	Pollutant sorption-desorption

Heinz P. Kollig Measurements Branch FTS 250-3770 404-546-3770	Rate constant data for pollutant-fate modeling
John M. McGuire Measurements Branch FTS 250-3185 404-546-3185	Multispectral identification of organic chemicals
Lee A. Mulkey Assessment Branch FTS 250-3476 404-546-3476	Multimedia modeling and uncertainty analysis
John E. Rogers Biology Branch FTS 250-3592 404-546-3592	Anaerobic biodegradation processes
Charles N. Smith Assessment Branch FTS 250-3302 404-546-3302	Conduct of field studies Analysis of monitoring data
William C. Steen Measurements Branch FTS 250-3776 404-546-3776	Aerobic microbial transformation rate measurement
Eric J. Weber Chemistry Branch FTS 250-3198 404-546-3198	Pollutant degradation
N. Lee Wolfe Chemistry Branch FTS 250-3429 404-546-3429	Pollutant degradation

HOLCOMB RESEARCH INSTITUTE
INTERNATIONAL GROUND WATER MODELING CENTER

Milovan S. Beljin Senior Research Assistant 317-283-9458	Groundwater models Software support Model use
Margaret A. Butorac Technical Program Assistant 317-283-9458	Short course coordination Newsletter production Publication & software distribution
Aly I. El-Kadi Research Scientist 317-283-9458	Flow and transport modeling Stochastic modeling Training

Paul K.M. van der Heijde Director 317-283-9458	Groundwater modeling research and training
Richard E. Rice Research Scientist 317-283-9458	Ground-water chemistry Hydrochemical modeling
Stanley A. Williams Hydrologist 317-283-9458	Ground-water models Software support Model use

ENVIRONMENTAL CRITERIA AND ASSESSMENT OFFICE - CINCINNATI

Randall J.F. Bruins Systemic Toxicants Assessment Branch FTS 684-7539 513-569-7539	Ground-water risk assessment methodologies
Larry Fradkin Systemic Toxicants Assessment Branch FTS 684-7584 513-569-7584	Ground-water risk assessment methodologies

EXPOSURE ASSESSMENT GROUP

Seong T. Hwang Exposure Assessment Group FTS 475-8919 202-475-8919	Fate and transport modeling Health risk assessment for ground-water contaminants Selection of models for exposure assessment Analysis of monitoring data
John Schaum Exposure Assessment Group FTS 475-8920 202-475-8920	Fate and transport modeling Health risk assessment for ground-water contaminants Selection of models for exposure assessment Analysis of monitoring data

HAZARDOUS WASTE ENGINEERING RESEARCH LABORATORY

Douglas C. Ammon Remedial Action Staff FTS 684-7876 513-569-7876	Remedial Investigation/Feasibility Study process Remedial action costs and modeling
Naomi P. Barkley Remedial Action Staff FTS 684-7854 513-569-7854	Plume management Building decontamination Grouting

Edwin Barth Remedial Action Staff FTS 684-7875 513-569-7875	Stabilization/fixation
Michael I. Black Remedial Action Staff FTS 684-7664 513-569-7664	Gas works site
John Brugger Technology Development Staff FTS 340-6634 201-321-6634	Physical, chemical, biological, and thermal treatment Contaminated ground-water control
Paul dePercin Pollution Assessment Staff FTS 684-7797 513-569-7797	Volatile emissions Fugitive dust control Stabilization/fixation
G. Kenneth Dotson Pollution Assessment Staff FTS 684-7858 513-569-7858	Soil liners
John Farlow Technology Development Staff FTS 340-6631 201-321-6631	Underground storage tanks (UST) hazardous release technology
Richard Field Technology Development Staff FTS 340-6674 210-321-6674	UST reportable quantity technology Ground-water hydraulics
Uwe Frank Chemistry Staff FTS 340-6626 201-321-6626	Chemical analysis Soil-water chemistry
Frank Freestone Technology Evaluation Staff FTS 340-6632 201-321-6632	On-site technology Superfund Innovative Technology Evaluation (SITE) program
Daniel G. Greathouse Pollution Control Staff FTS 684-7859 513-569-7859	Expert systems Statistical design and analysis
Richard Griffiths Technology Development Staff FTS 340-6629 201-321-6629	OHMSETT[*] facility, oil spill technology Water chemistry

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[*] Oil and Hazardous Materials Simulated Environmental Test Tank.

Walter G. Grube, Jr. Pollution Assessment Staff FTS 684-7798 513-569-7798	Slurry walls Soil and admixture liners Hydraulic conductivity
Michael Gruenfeld Chemistry Staff FTS 340-6625 201-321-6625	Chemical analysis Personnel protection Soil-water chemistry
Eugene F. Harris Land Pollution Control Division FTS 684-7838 513-569-7838	Mining sites Technical Assistance Large-volume wastes
Robert P. Hartley Pollution Control Division FTS 684-7838 513-569-7838	Covers Flexible membrane liners
Ronald D. Hill Land Pollution Control Division FTS 684-7861 513-569-7861	Superfund Innovative Technology Evaluation (SITE) program *In-Situ* Treatment
Robert Hillger Technology Development Staff FTS 340-6639 201-321-6639	Underground storage tank technology
Jonathan G. Herrmann Pollution Control Staff FTS 684-7839 513-569-7839	Sorbents Electrokinetics Construction QA/QC
Janet M. Houthoofd Remedial Action Staff FTS 684-7863 513-569-7863	Mine storage
Stephen C. James Land Pollution Control Division FTS 684-7877 513-569-7877	Superfund Innovative Technology Evaluation (SITE) program
Robert E. Landreth Pollution Control Staff FTS 684-7836 513-569-7836	Flexible membrane liners Municipal solid waste Expert systems
Norma Lewis Land Pollution Control Division FTS 684-7877 513-569-7877	Superfund Innovative Technology Evaluation (SITE) program

Ronald F. Lewis Remedial Action Staff FTS 684-7856 513-569-7856	Biodegradation technology Soil contamination
Hugh Masters Technology Evaluation Staff FTS 340-6678 201-321-6678	UST canine olfaction technology Technical Information Exchange (TIX)
Charles J. Moench, Jr. Pollution Control Staff FTS 684-7819 513-569-7819	Municipal solid waste leaching Municipal solidwsate combustion residue
Charles I. Mashni Pollution Assessment Staff FTS 684-7857 513-569-7857	Hazardous waste leachates
Edward J. Opatken Remedial Action Staff FTS 684-7855 513-569-7855	Thermoplastics Ion exchange Leachate treatment
Mike H. Roulier Pollution Assessment Staff FTS 684-7796 513-569-7796	Soil liners Waste leaching
Michael Royer Chemistry Staff FTS 340-6633 201-321-6633	Personnel protection
Donald E. Sanning Remedial Action Staff FTS 684-7875 513-569-7875	Remedial action Uncontrolled sites *In-situ* treatment
Norbert B. Schomaker Containment Branch FTS 684-7871 513-569-7871	Hazardous waste land disposal Municipal solid waste
Mary Stinson Technology Evaluation Staff FTS 340-6683 201-321-6683	Superfund Innovative Technology Evaluation (SITE) program
Anthony Tafuri Technology Development Staff FTS 340-6604 201-321-6604	UST technology *In-situ* treatment processes

Richard Traver Technology Evaluation Staff FTS 340-6677 201-321-6677	Mobile, on-site, *in-situ* treatment technology
Ira Wilder Releases Control Branch FTS 340-6635 201-321-6635	Waste site hazardous releases
Carlton C. Wiles Pollution Assessment Staff FTS 684-7795 513-569-7795	Solidification, stabilization, fixation, and encapsulation Surface impoundments Municipal solid wastes
James Yezzi, Jr. Technology Evaluation Staff FTS 340-6703 201-321-6703	Mobile treatment technology

WATER ENGINEERING RESEARCH LABORATORY

Robert M. Clark Director, Drinking Water Research Division FTS 684-7201 513-569-7201	Treatment technology cost estimation
Walter A. Feige Drinking Water Research Division FTS 684-7496 513-569-7496	Organic treatment processes
Kim R. Fox Inorganics and Particulate Control Branch FTS 684-7820 513-569-7820	Radionuclide treatment processes
Carol Ann Fronk Organics Control Branch FTS 684-7592 513-569-7592	Organic treatment processes
James A. Goodrich Systems and Cost Evaluation Staff FTS 684-7605 513-569-7605	Modeling
Richard P. Lauch Inorganics and Particulate Control Branch FTS 684-7237 513-569-7237	Radium and nitrate treatment processes
Benjamin W. Lykins, Jr. Systems and Cost Evaluation Staff FTS 684-7460 513-569-7460	Organic treatment processes

Richard Miltner Organics Control Branch FTS 684-7403 513-569-7403	Organic treatment processes
Thomas J. Sorg Inorganics and Particulate Control Branch FTS 684-7370 513-569-7370	Inorganic treatment processes

4. TECHNICAL ASSISTANCE CONTACTS BY SUBJECT

Subject	Name	Office	FTS	Commercial
Aquifer restoration				
Biodegradation	John Wilson	RSKERL	743-2259	405-332-8800
	Michael Henson	RSKERL	743-2420	405-332-8800
In-situ	Jerry Jones	RSKERL	743-2251	405-332-8800
	James McNabb	RSKERL	743-2216	405-332-8800
Biodegradation	Ron Lewis	HWERL	684-7856	513-569-7856
	John Wilson	RSKERL	743-2259	405-332-8800
Chemistry				
Analytical chemistry				
Inorganic	Bert Bledsoe	RSKERL	743-2324	405-332-8800
	Don Clark	RSKERL	743-2311	405-332-8800
	Fred Pfeffer	RSKERL	743-2305	405-332-8800
Organic	Roger Cosby	RSKERL	743-2320	405-332-8800
	Garmon Smith	RSKERL	743-2316	405-332-8800
Chemical analysis	Uwe Frank	HWERL	340-6626	201-321-6626
	Michael Gruenfeld	HWERL	340-6625	201-321-6625
Multispectral	John McGuire	ERL-Ath	250-3185	404-546-3185
Ground-water	Richard Rice	IGWMC		317-283-9458
Soil chemistry	Don Kampbell	RSKERL	743-2332	405-332-8800
Soil-water chemistry	Uwe Frank	HWERL	340-6626	201-321-6626
	Michael Gruenfeld	HWERL	340-6625	201-321-6625
Transformation rates	Jack Ellington	ERL-Ath	250-3197	404-546-3210
	Heinz Kollig	ERL-Ath	250-3770	404-546-3770
Water chemistry	Richard Griffiths	HWERL	340-6629	201-321-6629
	Jerry Jones	RSKERL	743-2251	405-332-8800
Control of Contaminated ground water	John Brugger	HWERL	340-6634	201-321-6634
Contaminant source control				
Covers	Robert Hartley	HWERL	684-7838	513-569-7838
Construction QA/QC	Jonathan G. Herrmann	HWERL	684-7839	513-569-7839
Gas works site	Michael Black	HWERL	684-7664	513-569-7664
Flexible membrane liners	Robert Hartley	HWERL	684-7838	513-569-7838
	Robert Landreth	HWERL	684-7836	513-569-7836
Fugitive dust control	Paul dePercin	HWERL	684-7797	513-569-7797
Hazardous waste land disposal	Norbert Schomaker	HWERL	684-7871	513-569-7871
Mining sites	Eugene Harris	HWERL	684-7838	513-569-7838
Municipal solid waste	Robert Landreth	HWERL	684-7836	513-569-7836
	Charles Moench, Jr.	HWERL	684-7819	513-569-7857
	Norbert Schomaker	HWERL	684-7871	513-569-7871
Slurry walls	Walter Grube, Jr.	HWERL	684-7798	513-569-7798
Soil liners	G. Kenneth Dotson	HWERL	684-7858	513-569-7858
	Walter Grube, Jr.	HWERL	684-7798	513-569-7798
	Mike Roulier	HWERL	684-7796	513-569-7796
Underground Storage Tanks (UST)	John Farlow	HWERL	340-6631	201-321-6631
	Richard Field	HWERL	340-6674	210-321-6674

Subject	Name	Office	FTS	Commercial
Contaminant source control (Cont.)				
	Robert Hillger	HWERL	340-6639	201-321-6639
	Anthony Tafuri	HWERL	340-6604	201-321-6604
	Jerry Jones	RSKERL	743-2251	405-332-8800
canine olfaction	Hugh Masters	HWERL	340-6678	201-321-6678
Waste leaching	Mike Roulier	HWERL	684-7796	513-569-7796
Wastewater land treatment	Lowell Leach	RSKERL	743-2333	405-332-8800
Volatile emissions	Paul dePercin	HWERL	684-7797	513-569-7797
Fate of contaminants				
Anaerobic				
biodegradation	John Rogers	ERL-Ath	250-3592	404-546-3592
biotransformations	Michael Henson	RSKERL	743-2420	405-332-8800
Degradation	Eric Weber	ERL-Ath	250-3198	404-546-3198
	N. Lee Wolfe	ERL-Ath	250-3429	404-546-3429
Metals	Bert Bledsoe	RSKERL	743-2324	405-332-8800
	Leo Azarraga	ERL-Ath	250-3453	404-546-3453
	George Bailey	ERL-Ath	250-3307	404-546-3307
Metals speciation	David Brown	ERL-Ath	250-3310	404-546-3310
Organics	William Dunlap	RSKERL	743-2314	405-332-8800
Pesticide field studies	Charles Smith	ERL-Ath	250-3302	404-546-3302
Sorption/desorption	Chad Jafvert	ERL-Ath	250-3349	404-546-3349
Geographic Information System	Eric Koglin	EMSL-LV	545-2432	702-798-2432
Ground-water hydraulics	Richard Field	HWERL	340-6674	210-321-6674
Hydraulic conductivity	Walter Grube Jr.	HWERL	684-7798	513-569-7798
Hydrogeology	Joe D'Lugosz	EMSL-LV	545-2598	702-798-2598
	Jerry Thornhill	RSKERL	743-2310	405-332-8800
	Charles Morgan	EMSL-LV	545-2389	702-798-2389
Hydrolysis rate constants	J.J. Ellington	ERL-Ath	250-3197	404-546-3197
Injection wells	Lowell Leach	RSKERL	743-2333	405-332-8800
	Jerry Thornhill	RSKERL	743-2310	405-332-8800
Monitoring	Aldo Mazzella	EMSL-LV	545-2254	702-798-2254
	Ken Scarbrough	EMSL-LV	545-2645	702-798-2645
International Ground Water Modeling Center				
Courses, publications	Margaret Butorac	IGWMC		317-283-9458
Software support	Milovan Beljin	IGWMC		317-283-9458
	Stanley Williams	IGWMC		317-283-9458

Subject	Name	Office	FTS	Commercial
Large-Volume Wastes	Eugene Harris	HWERL	684-7862	513-569-7862
Microbiology	John Wilson	RSKERL	743-2259	405-332-8800
Mining	S. Jackson Hubbard	HWERL	684-7502	513-569-7502
Modeling	Douglas Ammon	HWERL	684-7876	513-569-7876
	Milovan Beljin	IGWMC		317-283-9458
	Stanley Williams	IGWMC		317-283-9458
Applications	Robert Carsel	ERL-Ath	250-3565	404-546-3565
Contaminant fate	Seong Hwang	EAG	475-8919	202-475-8919
	John Schaum	EAG	475-8920	202-475-8920
treatment	James Goodrich	WERL	684-7605	513-569-7605
transport	Carl Enfield	RSKERL	743-2334	405-332-8800
	Seong Hwang	EAG	475-8919	202-475-8919
	John Schaum	EAG	475-8920	202-475-8920
	Thomas Short	RSKERL	743-2234	405-332-8800
	Scott Yates	RSKERL	743-2246	405-332-8800
porous media	Fred Fong	ERL-Ath	250-3210	404-546-3210
Exposure assessment	Seong Hwang	EAG	475-8919	202-475-8919
	John Schaum	EAG	475-8920	202-475-8920
Flow and transport	Aly I. El-Kadi	IGWMC		317-283-9458
Hydrochemical	Richard Rice	IGWMC		317-283-9458
Mathematical	R. Rajagopal	EMSL-LV	545-2358	702-798-2358
	Fred Fong	ERL-Ath	250-3210	404-546-3210
Model use	Milovan Beljin	IGWMC		312-283-9458
	Stanley Williams	IGWMC		317-283-9458
Multimedia	Lee Mulkey	ERL-Ath	250-3476	404-546-3476
Research	Paul van der Heijde	IGWMC		317-283-9458
Pollutant rate constants	Heinz Kollig	ERL-Ath	250-3770	404-546-3770
Stochastic	Aly I. El-Kadi	IGWMC		317-283-9458
Training	Aly I. El-Kadi	IGWMC		317-283-9458
	Paul van der Heijde	IGWMC		317-283-9458
Monitoring				
	Lowell Leach	RSKERL	743-2333	405-332-8800
Analysis of data	Seong Hwang	EAG	475-8919	202-475-8919
	John Schaum	EAG	475-8920	202-475-8920
	Charles Smith	ERL-Ath	250-3302	404-546-3302
CERCLA site investigation	Aldo Mazzella	EMSL-LV	545-2254	702-798-2254
Data acquisition	Charles Morgan	EMSL-LV	545-2389	702-798-2389
Fractured bedrock	Eric Koglin	EMSL-LV	545-2432	702-798-2432
Indicator parameters	Anne Pitchford	EMSL-LV	545-2366	702-798-2366
Injection wells	Aldo Mazzella	EMSL-LV	545-2254	702-798-2254
	Ken Scarbrough	EMSL-LV	545-2645	702-798-2645
In-situ methods	Larry Eccles	EMSL-LV	545-2385	702-798-2385
Geophysical methods	Aldo Mazzella	EMSL-LV	545-2254	702-798-2254
Method standards/QA	Ann Pitchford	EMSL-LV	545-2366	702-798-2366
Sampling techniques	Jane Denne	EMSL-LV	545-2655	702-798-2655
	Marion (Dick) Scalf	RSKERL	743-2308	405-332-8800
Soil Gas	Phil Durgin	EMSL-LV	545-2623	702-798-2623

Subject	Name	Office	FTS	Commercial
Monitoring (Cont.)				
Systems	R. Rajagopal	EMSL-LV	545-2358	702-798-2358
Technology transfer	John Worland	EMSL-LV	545-2656	702-798-2656
UST external leak detection	Jeff van Ee	EMSL-LV	545-2367	702-798-2367
Vadose Zone	Larry Eccles	EMSL-LV	545-2385	702-798-2385
Well construction	Jane Denne	EMSL-LV	545-2655	702-798-2655
Well placement	Eric Koglin	EMSL-LV	545-2432	702-798-2432
Oil & Hazardous Materials Simulated Environ. Test Tank	Richard Griffiths	HWERL	340-6629	201-321-6629
Pesticides				
Field studies	Charles Smith	ERL-Ath	250-3302	404-546-3302
Remedial action	Douglas Ammon	HWERL	684-7876	513-569-7876
	Donald Sanning	HWERL	684-7875	513-569-7875
Biodegradation	John Wilson	RSKERL	743-2259	405-332-8800
	Ronald Lewis	HWERL	684-7856	513-569-7856
Building decontamination	Naomi Barkley	HWERL	684-7854	513-569-7854
Electrokinetics	Jonathan Herrmann	HWERL	684-7863	513-569-7863
In-situ treatment	Ronald Hill	HWERL	684-7861	513-569-7861
	Donald Sanning	HWERL	684-7875	513-569-7875
Mobile	Richard Traver	HWERL	340-6677	201-321-6677
	James Yezzi, Jr.	HWERL	340-6703	201-321-6703
Ion exchange	Edward Opatken	HWERL	684-7855	513-569-7855
Land treatment of hazardous wastes	John Matthews	RSKERL	743-2233	405-332-8800
	Leon Myers	RSKERL	743-2202	405-332-8800
Leachate treatment	Edward Opatken	HWERL	684-7855	513-569-7855
Mine storage	Janet Houthoofd	HWERL	684-7863	513-569-7863
Oil spill technology	Richard Griffiths	HWERL	340-6629	201-321-6629
On-site technology	Frank Freestone	HWERL	340-6632	201-321-6632
Personnel protection	Michael Gruenfeld	HWERL	340-6625	201-321-6625
	Michael Royer	HWERL	340-6633	201-321-6633
Plume management	Naomi Barkley	HWERL	684-7854	513-569-7854
Construction QA/QC	Jonathan Herrmann	HWERL	684-7839	513-569-7839
Soil contamination	Ronald Lewis	HWERL	684-7856	513-569-7856
Sorbents	Paul dePercin	HWERL	684-7797	513-569-7797
	Jonathan Herrmann	HWERL	684-7839	513-569-7839
Stabilization/fixation	Edwin Barth	HWERL	684-7875	513-569-7875
	Janet Houthoofd	HWERL	684-7863	513-569-7863
	Charles Mashni	HWERL	684-7857	513-569-7857
	Carlton Wiles	HWERL	684-7795	513-569-7795
Technical information Exchange	Hugh Masters	HWERL	340-6678	210-321-6678
Thermoplastics	Edward Opatken	HWERL	684-7855	513-569-7855
Treatment	John Brugger	HWERL	340-6634	201-321-6634
	John Wilson	RSKERL	743-2259	405-332-8800
Uncontrolled sites	Donald Sanning	HWERL	684-7875	513-569-7875
Waste site releases	Ira Wilder	HWERL	340-6635	201-321-6635

Subject	Name	Office	FTS	Commercial
Rate constants	Heinz Kollig	ERL-Ath	250-3770	404-546-3770
Resource management/economics	R. Rajagopal	EMSL-LV	545-2358	702-798-2358
Risk assessment	Randall Bruins	ECAO-CIN	684-7539	513-569-7539
	Larry Fradkin	ECAO-CIN	684-7584	513-569-7584
Health	Seong Hwang	EAG	475-8919	202-475-8919
	John Schaum	EAG	475-8920	202-475-8920
SITE (Superfund Innovative Technology Evaluation Program)				
	Frank Freestone	HWERL	340-6632	201-321-6632
	Ronald Hill	HWERL	684-7861	513-569-7861
	Stephen James	HWERL	684-7877	513-569-7877
	Norma Lewis	HWERL	684-7877	513-569-7877
	Mary Stinson	HWERL	340-6683	201-321-6683
Soil chemistry	Don Kampbell	RSKERL	743-2332	405-332-8800
Soil-water chemistry	Uwe Frank	HWERL	340-6626	201-321-6626
	Michael Gruenfeld	HWERL	340-6625	201-321-6625
Statistical design and analysis	Daniel Greathouse	HWERL	684-7859	201-569-7859
Subsurface abiotic processes	Dermont Bouchard	RSKERL	743-2321	405-332-8800
	Marvin Piwoni	RSKERL	742-2262	405-332-8800
	Lynn Wood	RSKERL	743-2304	405-332-8800
Subsurface microbiology	John Wilson	RSKERL	743-2259	405-332-8800
Subsurface sampling	Jane Denne	EMSL-LV	545-2655	702-798-2655
	Lowell Leach	RSKERL	743-2333	405-332-8800
Testing for toxicity	John Mathews	RSKERL	743-2233	405-332-8800
Transport of contaminants				
Metals	David Brown	ERL-Ath	250-3310	404-546-3310
Modeling	Carl Enfield	RSKERL	743-2334	405-332-8800
	Thomas Short	RSKERL	743-2234	405-332-8800
	Scott Yates	RSKERL	743-2246	405-332-8800
porous media	Fred Fong	ERL-Ath	250-3210	404-546-3210
Organics	William Dunlap	RSKERL	743-2314	405-332-8800
Viruses	Marylynn Yates	RSKERL	743-2236	405-332-8800

Subject	Name	Office	FTS	Commercial
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Inorganic processes	Thomas Sorg	WERL	684-7370	513-569-7370
In-situ biorestoration	John Wilson	RSKERL	743-2259	405-332-8800
Modeling	James Goodrich	WERL	684-7605	513-569-7605
Nitrate processes	Richard Lauch	WERL	684-7237	513-569-7237
Organic processes	Walter Feige	WERL	684-7496	513-569-7496
	Carol Ann Fronk	WERL	684-7592	513-569-7592
	Benjamin Lykins, Jr.	WERL	684-7460	513-569-7460
	Richard Miltner	WERL	684-7403	513-569-7403
Radionuclides	Kim Fox	WERL	684-7820	513-569-7820
Radium processes	Richard Lauch	WERL	684-7237	513-569-7237
Technology costs	Robert Clark	WERL	684-7201	513-569-7201
Uncertainty analysis	Robert Carsel	ERL-Ath	250-3565	404-546-3565
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Underground Storage Tanks (UST)				
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	Robert Hillger	HWERL	340-6639	201-321-6639
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	Jerry Jones	RSKERL	743-2251	405-332-8800
Canine olfaction	Hugh Masters	HWERL	340-6678	201-321-6678
External leak detection monitoring	Jeff van Ee	EMSL-LV	545-2367	702-798-2367
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5. PROGRAM OFFICE AND REGIONAL OFFICE CONTACTS

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6. ANNOTATED BIBLIOGRAPHY

These documents were selected by ORD for inclusion in the Directory as essential references for permitting or other regulatory personnel involved in ground-water protection and treatment.

EPA documents are cited in the bibliography using both the EPA document number (*e.g.*, EPA/600/8-86/004) and the National Technical Information Service number (prefixed by a PB; *e.g.*, PB 81-166-340). EPA documents may be consulted in the EPA Headquarters or Regional libraries, though in some Regional libraries it may be necessary to cross-reference documents from the EPA or NTIS classification to another classification scheme (*e.g.*, Library of Congress or EPAX). EPA documents that are marked *CERI* are available from ORD Publications, Cincinnati, Ohio (FTS 684-7562, or 513-569-7562). The rest must be purchased from NTIS at 5285 Port Royal Road, Springfield, Virginia 22161 (FTS/703-487-4650).

Documents are listed by subject category under one of the following seven headings:

- Overview.
- Monitoring.
- Fate and Transport.
- Aquifer Reclamation.
- Treatment.
- Source Control.
- Risk Assessment.

OVERVIEW

EPA Ground-Water Research Programs. EPA/600/8-86/004, PB86 212-552, April 1986. *CERI.*

A description of EPA's role in ground-water research and current EPA research in five major areas of concern: source control, prediction, monitoring, aquifer cleanup, and information transfer and technical assistance. The specific roles of various EPA branches and laboratories in ground-water research are discussed along with future research directives.

Protection of Public Water Supplies from Ground-Water Contamination. EPA/625/4-85/016, PB86 168-358, September 1985. *CERI.*

Material from a series of technology transfer seminars designed to help the water-supply community prevent contamination and treat previously contaminated water supplies. There is a good description of basic ground-water hydrology as well as sections dealing with classification of ground-water regions, ground-water and surface-water relationships, ground-water pollution, management alternatives, controlling volatile organic compounds in ground water used for drinking, and *in-situ* treatment, restoration and reclamation of ground water.

Underground Waste Management and Environmental Implications. T.D. Cook, Ed. Amer. Assoc. Petroleum Geol. 1972.

A collection of papers from the Symposium on Underground Waste Management and Environmental Implications held in Houston, Texas, December 6-9, 1971. The papers discuss the volume of wastes being disposed underground, the techniques of underground disposal, the effects of mistakes and accidents and the ability to recognize and avoid mistakes and recover from accidents, the role of regulatory agencies, and the costs of various underground disposal methods.

Water Well Technology. M.D. Campbell and J.H. Lehr. National Water Well Association, 1982.

A basic compendium of all of the salient features of water well technology. It is a complete review of the water well industry including exploratory drilling, development of production wells for industrial, municipal, and individual domestic water supplies, water quality, and treatment of drilling contaminants.

Handbook of Applied Hydrology: A Compendium of Water Resources Technology. V.T. Chow, Ed. McGraw-Hill, 1964.

An interdisciplinary handbook covering hydrology and water-resources technology. Information comes under four major groupings dealing with: the closely related sciences upon which hydrology depends; various phases of the hydrologic cycle and phenomena; practice and application of hydrology in various fields; and some socio-economic aspects of hydrology, including planning, policy, and law.

Ground-Water Hydraulics. S.W. Lohman, Geological Survey Professional Paper 708, 1972.

A basic textbook for working professionals covering all subjects of concern in ground-water hydraulics--the natural or induced movement of water through permeable geologic formations. The principal method of analysis in ground-water hydraulics is the application, generally by field tests of discharging wells, of equations derived for particular boundary conditions. Topics discussed include unsaturated zone testing, aquifer testing, and confined and unconfined conditions.

MONITORING

Methods for Determining Permeability, Transmissibility, and Drawdown. R. Bentall, Geological Survey Water-Supply Paper 1536-I, 1963.

Suggestions for correcting drawdown measurements analyzed by the Theis graphical method; remarks pertaining to Wenzel's limiting formula, gradient formula, and the recovery method; a formula for corrections to be applied if wells used for aquifer tests tap less than the full thickness of the aquifer; formulas for the determination of aquifer constants from water-level data obtained when a well is bailed or a slug of water is injected into a well; analyses of the effects of cyclic fluctuations of the water level, the pumping rate, or the pumping interval; and methods relating the specific capacity of a well to the aquifer coefficient of transmissibility.

Theory of Aquifer Tests. J.G. Ferris, D.B. Knowles, R.H. Brown, and R.W. Stallman, Geological Survey Water-Supply Paper 1536-E, 1962.

Survey of developments in fluid mechanics that apply to ground-water hydrology. The origin, occurrence, and motion of ground water in relation to the development of terminology and analytic expressions for selected flow systems. Emphasis is on concepts, principles, and the delineating limits of applicability of mathematical models for analyzing flow systems in the field. The importance of the geologic variable and its role in governing the flow regimen is stressed.

Specific Yield--Compilation of Specific Yields for Various Materials. A.I. Johnson, Geological Survey Water-Supply Paper 1662-D, 1967.

A compendium of excerpts from selected reports that present and evaluate methods for determining specific yield, limitations of those methods, and results of the determinations made on a wide variety of rock and soil materials. Although no particular values are recommended in this report, it does summarize values of specific yield and their averages determined for 10 rock textures.

Underground Tank Leak Detection Methods: A State-of-the-Art Review. EPA/600/2-86/001, PB86 137-155, January 1986.

A discussion of 36 leak detection methods for underground storage tanks used primarily for gasoline and other liquid petroleum fuels. The emphasis is on volumetric and non-volumetric leak detection methods. General engineering comments are provided for each method and there is a discussion of variables that may affect the accuracy of each method.

Practical Guide for Ground-Water Sampling. EPA/600/2-85/104, PB86 137-304, September 1985. *CERI.*

Detailed information on how to conduct a ground-water sampling program. Topics covered include: sampling frequency and analytical detail required for assessment of monitoring data sets; well placement, construction and design; well development, performance, maintenance, and purging strategies; and sampling mechanisms and collection. There are also recommended protocols for various types of sampling and discussions of associated errors.

"*Sorption of Organics by Monitoring Well Construction Materials*." A.L. Sykes, R.A. McAllister, and J.B. Homolya, Ground Water Monitoring Review, 6(4):44-47, Fall 1986.

A study of the effect of well-casing material (PVC, teflon, or stainless steel) on the sorption of volatile organic hydrocarbons found in contaminated groundwater. It also considers the sampling and storage stabilities of these contaminants for periods up to nine days. Results showed no significant differences in sorption between casing materials, but did find that length of storage resulted in some variability.

"*Underground Storage Tank Monitoring: Observation Well Based Systems*." R.A. Scheinfeld, J.B. Robertson, and T.G. Schwendeman, Ground Water Monitoring Review, 6(4):49-55, Fall 1986.

A discussion of the currently available leak-detection monitoring systems that can be used with the three main types of observation wells: ground-water observation wells, vapor wells and U-tubes. Seven types of liquid hydrocarbon detectors and six types of hydrocarbon vapor detectors are described.

"*The Effect of Sampling Frequency on Ground Water Quality Characterization*." R. Rajagopal, Ground Water Monitoring Review, 6(4):65-73, Fall 1986.

Nitrate levels in Quaternary aquifers and fluorides and sulfates in Cambro-Ordovician aquifers in Iowa were studied to determine the relationship between sampling frequency and the reliability of the information obtained. Since many of the distribution curves for chemicals in ground water are positively skewed, a broader perspective of the distribution of chemicals in the ground water could be obtained by studying a spectrum of parameters. Using these parameters enabled close estimation of nitrates, fluorides, and sulfates in selected aquifers with as few samples as 50, 100, or 250.

"*The Use of Industrial Hygiene Samplers for Soil-Gas Surveying*." H.B. Kerfoot and C.L. Mayer, Ground Water Monitoring Review, 6(4):74-78, Fall 1986.

A description of soil-gas surveying using a passive sampler, which allows quantitative determination of concentration of volatile organic compounds and remote analysis of samples. Use of this sampler above a chloroform ground-water plume is compared to results obtained through ground-water analysis and from a previous soil gas study above the same plume. Chloroform concentrations measured with passive samplers correlate well with the other two techniques. The short-term variability of the technique is characterized by a coefficient of variation of 12% over a 27-foot distance for nine samplers, and compares favorably with grab-sample results at the same location.

Unsaturated Zone Monitoring Protocols for Hazardous Waste Land Treatment Units. L.G. Everett, L.G. Wilson, and L.G. McMillion, National Water Well Association Proceedings in Las Vegas, Nevada, December 8-10, 1983.

A discussion of unsaturated zone monitoring at hazardous-waste land treatment units with particular reference to the Unsaturated Zone Monitoring Requirements in the hazardous-waste land-disposal regulations. Methods for detecting slowly and rapidly moving hazardous constituents include many types of hand-held and power-driven soil samplers and suction lysimeters. Criteria for sample selection, number, frequency, size, and depths are presented.

Shortcuts and Special Problems in Aquifer Tests. R. Bentall, Ed. Geological Survey Water-Supply Paper 1545-C, 1963.

Seventeen previously unpublished papers dealing with special methods for solving fundamental ground-water formulas or solving particular ground-water problems are brought together. Shortcut methods include the use of special charts, scales, or graphs for the solution of the general nonequilibrium formula. Some extend the equilibrium straight-line methods to obtain more information with less work; some analyze specific boundary problems; and one discusses hydraulic and economic factors in well spacing in a multiple-well system.

A Guide to the Selection of Materials for Monitoring Well Construction and Ground-Water Sampling. M.J. Barcelona, J.P. Gibb, and R.A. Miller, Illinois State Water Survey Contract Report 327, 1983.

A basic text on the selection of cost-effective materials, target chemical constituents, and procedures for monitoring-well casing materials to minimize disturbance of the subsurface. Other topics covered include sampling apparatus and strategies, monitoring-well network design, and specific recommendations.

Ground Water and Wells. E.E. Johnson, Ed. Johnson Division, UOP, Inc., Minneapolis, Minnesota, 1982.

A basic reference presenting the technical aspects of ground-water occurrence, ground-water movement, well hydraulics, well design and ground-water geology, and the practical aspects of well drilling, well-screen selection, well maintenance, and well operation.

Analysis and Evaluation of Pumping Test Data. E.P. Kruseman and N.A. De Ridder, Inter. Inst. Land Reclamation and Improvement, P.O. Box 6700AA, Wageningen, Netherlands, 1983.

A guidebook for analyzing and evaluating data from pumping tests. The methods presented are collected from the literature dealing with ground-water flow towards discharging wells, with emphasis on when and how to apply a certain method. Users of the book will need only an elementary background of mathematics and physics.

Practical Hydraulics. A.L. Simon, John Wiley & Sons, 1976.

A basic reference on the science of hydraulics, including chapters on the physical properties of water, laws of fluid mechanics, water pressure, pipe flow, pumps, seepage, elements of hydrology, open channel flow, flow through hydraulic structures, and flow measurements.

FATE AND TRANSPORT

Modeling Remedial Actions at Uncontrolled Hazardous Waste Sites. EPA/540/2-85/001, PB85 211-357, April 1985.

The use of mathematical models to assess remedial action performance at uncontrolled hazardous-waste sites is presented in this four volume set. The first volume presents model selection methodology. Volumes 2 and 3 describe remedial-action modeling requirements, model application guidance and numerical models for evaluation of subsurface and waste control actions. Volume 4 describes analytical and numerical model use for evaluation of remedial actions in surface water.

Users Manual for the Pesticide Root Zone Model (PRZM). EPA/600/3-84/109. December 1984. *CERI.*

The PRZM simulates the vertical movement of pesticides in the unsaturated soil within and below the plant root zone and extending to the water table. The model uses generally available input data and hydrology and chemical transport components to simulate runoff, erosion, plant uptake, leaching, decay, foliar washoff, and volatilization of the pesticide. Predictions can be made for daily, monthly, or annual output. It is designed to run on a DEC PDP 1170 mini-computer, but with modification will run on other computers with FORTRAN compilers.

Leaching Evaluation of Agricultural Chemicals (LEACH) Handbook. EPA/600/3-84/068, PB84 236-413, June 1984. *CERI.*

The LEACH method provides an indication of the presence, absence, and severity of pesticide leaching below the rooting depth for major crop growing areas of the United States. LEACH was developed from long-term simulation of annual pesticide-leaching time series using the Pesticide Root Zone Model. Key parameters of a pesticide-site-crop-management scenario are used to locate unique cumulative-frequency distributions, which indicate whether the annual quantity of pesticides leached past the crop rooting depth will exceed a given value.

MEXAMS--The Metals Exposure Analysis Modeling System. EPA/600/3-84/031, PB84 157-155, February 1984

MEXAMS provides enhanced capability for assessing the impact of priority-pollutant metals on aquatic systems. It allows the user to consider the complex chemistry affecting the behavior of metals in conjunction with the transport processes that affect their migration and fate. This is accomplished by linking MINTEQ, a geochemical model, to EXAMS, an aquatic exposure assessment model.

MINTEQ--A Computer Program for Calculating Aqueous Geochemical Equilibria. EPA/600/3-84/032, PB84 157-148, February 1984.

MINTEQ is a thermodynamic equilibrium model that computes aqueous speciation, adsorption, and precipitation/dissolution of solid phases. It combines the best features of two existing geochemical models, MINEQL and WATEQ3, and was developed for incorporation into the Metals Exposure Analysis Modeling System (MEXAMS). It has a well-documented thermodynamic data base that contains equilibrium constants and accessory data for seven priority-pollutant metals: arsenic, cadmium, copper, lead, nickel, silver, and zinc. MINTEQ also features algorithms for temperature correction and ionic-strength correction as well as six different adsorption algorithms and a large number of user-oriented features.

DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeological Settings. EPA/600/2-85/018, PB85 228-146, May 1985.

DRASTIC allows for the evaluation of the pollution potential of any hydrogeologic setting in the United States. Hydrogeologic settings are described for different regions of the United States and incorporate the major hydrogeologic factors that affect or control ground water movement: depth to water table, net recharge, aquifer media, topography, impact of the vadose zone, and hydraulic conductivity of the aquifer. These factors, which combine to form the acronym DRASTIC, are used to infer the potential for contamination of ground water. A numerical value, the DRASTIC INDEX, helps rank vulnerability to ground-water contamination.

Groundwater Transport: Handbook of Mathematical Models. I. Javandel, C. Doughty, and C.F. Tsang, Amer. Geophysical Union, Water Resources Monograph 10, 1984.

A presentation of the best and most usable mathematical methods for predicting the extent of subsurface contamination, in a format useful to field-response personnel. It contains selected analytical solutions, semianalytical methods and numerical approaches, and discusses the strengths and possible pitfalls in the application of each. It also contains comprehensive tables and computer-program listings. It should enable the user to make initial estimations of contaminant transport at a given site, and if the need arises, to select sophisticated numerical models.

Groundwater Management: The Use of Numerical Models (Second Edition). P. van der Heijde, Y. Bachmat, J. Bredehoeft, B. Andrews, D. Holtz, and S. Sebastian, Amer. Geophysical Union, Water Resources Monograph 5, 1985.

A compilation by the International Ground Water Modeling Center of information on almost 400 ground-water simulation models from around the world. There is a general discussion of ground water systems, a description of the basic equations used to model ground water systems, a detailed examination of the intrinsic strengths and deficiencies of existing ground-water models, and information on the use of models in management.

"Evolving Concepts of Subsurface Contaminant Transport," J.F. Keely, M.D. Piwoni, and J.T. Wilson, J. Water Pollution Control Fed. 58(5):349-357, May 1986.

This paper, by three EPA scientists, examines the changing perceptions of how natural processes control the fate of contaminants in the subsurface. The discussion focuses on three levels of understanding: conceptual (state of the knowledge), theoretical (state of the science), and practical (state of the art). Physical, chemical, and biological processes are discussed.

Ground Water Modeling Newsletter. International Ground Water Modeling Center, Holcomb Research Institute, Butler University, 4600 Sunset Avenue, Indianapolis, Indiana, 46208.

The *Ground Water Modeling Newsletter* is published quarterly by the Ground Water Modeling Center and is available free of charge [telephone (317) 283-9458]. It contains up-to-date information about new publications, computer models, conferences and seminars, and announcements of services related to ground-water modeling.

Ground-Water Modeling. J.W. Mercer and C.R. Faust, National Water Well Assoc., 1981.

Background and description of ground-water models for managers and hydrologists with little or no modeling experience. It explains the basic concepts in mathematical and numerical modeling and presents the uses and limitations of ground-water models as they are applied towards solving complicated ground-water problems.

AQUIFER RECLAMATION

"*In-Situ Biorestoration as a Ground Water Remediation Technique.*" J.T. Wilson, L.E. Leach, M. Henson, and J.N. Jones, Ground Water Monitoring Review, 6(4):56-64, Fall 1986.

This paper discusses the role of microorganisms in degrading or transforming a wide variety of subsurface organic contaminants and the possibilities for enhancing this process through various remediation techniques.

TREATMENT

"*Treatment of Ground-Water with Granular Activated Carbon.*" Wood, P.R., and DeMarco, J. J. Amer. Wtr. Wrks. Assn. 71(11):674-682, 1979.

An evaluation of raw, lime-softened, and finished water from the Hialeah, Florida, water system determined the adsorption capacities for four types of granular activated carbon. The carbons were tested for halogenated organic compounds, total organic compounds, and trihalomethane formation potential, as well as for several high molecular weight compounds.

Treatment of Volatile Organic Compounds in Drinking Water. EPA/600/8-83/019, PB83 239-434, May 1983.

A review of the properties, occurrence, and efforts to control the following organic chemicals in drinking water: tri- and tetrachloroethylene; cis- and trans-1,2-dichloroethylene; 1,1-dichloroethylene; vinyl and methylene chloride; 1,1,1-trichloroethane; 1,2-dichloroethane; carbon tetrachloride; benzene; chlorobenzene; 1,2-, 1,3-, and 1,4-dichlorobenzene; and 1,2,4-trichlorobenzene.

"*Treatment of Drinking Water Containing Trichloroethylene and Related Industrial Solvents.*" O.T. Love, Jr. and R.G. Eilers. J. Amer. Wtr. Wrks. Assoc., 74(8):413-425, 1982.

A discussion of the effects of aeration, adsorption, and boiling on water contaminated with the volatile organic solvents trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethylene, cis-1,2-dichloroethylene, carbon tetrachloride, and 1,2-dichloroethane. Characteristics of the compounds and estimates of the treatment costs are also provided.

Treatment Techniques for the Removal of Inorganic Contaminants from Drinking Water. T.J. Sorg, In: *Manual of Treatment Techniques for Meeting Interim Primary Drinking Water Regulations*, EPA/600/8-77/005, PB 268-029, May 1977. *CERI.*

Provides utilities with information needed to apply treatment necessary to improve their drinking-water quality to meet the Interim Primary Drinking Water Regulations for inorganic contaminants. It also provides information on the types of treatment techniques available and commonly used for removing inorganic contaminants in drinking water, and a discussion of the primary factors affecting removal results.

"Treatment Technology to Meet the Interim Primary Drinking Water Regulations for Inorganics (Part 1. Nitrate and Fluoride)." T.J. Sorg, J. Amer. Wtr. Wrks. Assoc. 70(2):105-112, 1978.

The first of a series, this article presents a summary of the USEPA Water Supply Research Division's overall project to evaluate contaminant removal techniques. The research program consisted of two phases: (1) a series of laboratory tests to determine critical variables affecting removal of contaminants and (2) pilot plant tests to verify laboratory results. This articles gives specific details on nitrate and flouride health effects, chemistry and removal treatment technology. Subsequent articles will review the treatment technology for the eight other NIPDWR-regulated inorganic contaminants and the radionuclides.

"Treatment Technology to Meet the Interim Primary Drinking Water Regulations for Inorganics (Part 2. Arsenic and Selenium)." T.J. Sorg and G.S. Logsdon. J. Amer. Wtr. Wrks. Assoc. 70(7):379-393, 1978.

The second in a series summarizing existing treatment technology to meet the inorganic National Interim Primary Drinking Water Regulations. Presents health effects, chemistry, and current treatment methods for removing arsenic and selenium from drinking water.

"Treatment Technology to Meet the Interim Primary Drinking Water Regulations for Inorganics (Part 3. Cadmium, Lead, and Silver)." T.J. Sorg and G.S. Logsdon, J. Amer. Wtr. Wrks. Assoc. 70(12):680-691, 1978.

The third in a series summarizing existing treatment technology to meet the inorganic National Interim Primary Drinking Water Regulations, this report describes current treatment methods for removing cadmium, lead, and silver from drinking water. The chemistry and health effects of each metal are presented.

"Treatment Technology to Meet the Interim Primary Drinking Water Regulations for Inorganics (Part 4. Chromium and Mercury)." T.J. Sorg, J. Amer. Wtr. Wrks. Assoc. 71(8):454-466, 1979.

The fourth in a series summarizing existing treatment technology to meet the inorganic National Interim Primary Drinking Water Regulations, this report describes current treatment methods for removing chromium and mercury from drinking water. Detailed discussion of the health effects of contamination and the chemistry of these two metals are included.

"Treatment Technology to Meet the Interim Primary Drinking Water Regulations for Inorganics (Part 5. Barium and Radionuclides)." T.J. Sorg and G.S. Logsdon, J. Amer. Wtr. Wrks. Assoc. 72(7):411-422, 1980.

The fifth in a series summarizing treatment technology to meet the inorganic National Interim Primary Drinking Water Regulations. This report describes current methods for removing barium and radionuclides from drinking water, along with discussions of the health effects and chemistry of these two contaminants.

"The Occurrence and Reduction of Sodium in Drinking Water." R.P. Lauch and T.J. Sorg, J. Amer. Wtr. Wrks. Assoc. 73(5):256-265, 1981.

Discussion of how sodium can be increased during drinking-water treatment, what concentrations can be expected after treatment, and how sodium in drinking water can be reduced or eliminated. A literature review on treatment techniques for reduction of total dissolved solids and a brief introduction on the health effects of sodium are also included.

"Removal of Radium-226 from Drinking Water by Reverse Osmosis in Sarasota, Florida." T.J. Sorg, R.W. Forbes, and D.S. Chambers, J. Amer. Wtr. Wrks. Assoc. 72(4):230-237, 1980.

Eight reverse osmosis treatment systems were studied for their effectiveness in removing naturally occurring ^{226}Ra and other dissolved solids from water. Although the age, type, and performance of the eight systems varied, all systems lowered the ^{226}Ra concentration in the raw water to below the EPA contaminant level of 5 pCi/L.

"Bacteriological Criteria for Ground Water Quality." M.J. Allen and E.E. Geldreich, Ground Water, 13(1):45-52, Jan-Feb 1975.

Article emphasizing the need for increased awareness and better detection of bacterial pathogens in untreated or marginally treated ground water used for human consumption. Well protection, unsatisfactory well construction, and inadequate treatment are common causes of poor ground-water quality.

"Microbiology of Potable Water and Groundwater." D.J. Reasoner, J. Water Pollution Control Fed. 55(6):891-895, 1983.

Recent studies of the microbiology of both potable water and ground water are presented in this paper. These studies include information on sampling techniques, environments conducive to different types of microbial growth, resistant strains of bacteria, and effects of various treatments on controlling microbial growth in different settings.

SOURCE CONTROL

Evaluating Cover Systems for Solid and Hazardous Waste. EPA Technical Resource Document, EPA/530/SW-867C, PB81 166-340, 1980.

A description of 36 steps for evaluating solid- and hazardous-waste cover systems, it helps form a basis for issuing a permit to the owner/operator of a waste-disposal facility. It discusses factors such as available soils, site conditions, details of cover design, post-closure maintenance, and contingencies.

Hydrologic Simulation on Solid Waste Disposal Sites (HSSWDS). EPA Technical Resources Document, EPA/530/SW-868C, PB81 166-332, 1980.

A microcomputer program for the IBM-PC/XT/AT to simulate a solid- or hazardous-waste disposal site operation. From minimal input data (geographic location, area, hydrologic length, and final soil and vegetative characteristics), the model will simulate daily, monthly, and annual runoff, deep percolation, temperature, soil-water, and evapotranspiration. The program is a combination of the SCS curve number runoff method and the hydrologic portion of the USDA-SEA hydrologic model (CREAMS), modified to conform to the design characteristics of solid and hazardous waste disposal sites. No prior experience with computer programming is necessary.

Landfill and Surface Impoundment Performance Evaluation. EPA Technical Resource Document, EPA/530/SW-869C, PB81 166-357, September 1980. (Revised April 1983)

Recommended procedures for evaluating the effectiveness of liquid transmission control systems for hazardous-waste landfill and surface impoundments. Equations allow a determination of the performance of compacted-clay liners intended to impede the vertical flow of liquids, sand or gravel drainage layers used to convey liquids laterally into collection systems, slopes on liners and drain layers, and spacings of collector drain pipes.

Management of Hazardous Waste Leachate. EPA Technical Resource Document, SW-871, EPA68-03-2766, PB81 189-359, September 1980.

Management options for a permit writer or hazardous-waste landfill operator to consider in controlling a leaching problem. The manual contains sections on: leachate generation; leachate composition and relative hazards; potential management options for off-site treatment of leachate or on-site treatment of hazardous waste; and a discussion of treatment technologies that have had reasonable success in treating leachate.

Closure of Hazardous Waste Surface Impoundments. EPA Technical Resource Document, EPA/530/SW-873, PB81 166-894, September 1980.

Considerations for planning the closure of surface impoundments containing hazardous wastes. It contains engineering techniques for closure operations that minimize the possibility of adverse environmental impacts.

The Hydrologic Evaluation of Landfill Performance (HELP) Model: Volume I. EPA Technical Resource Document EPA/530/SW-84/009, PB85 100-840, June 1984.

The HELP program was developed to facilitate rapid, economical estimation of the amounts of surface runoff, subsurface drainage, and leachate that may be expected from a wide variety of landfill designs. The program models the effects of hydrologic processes including precipitation, surface storage, runoff, infiltration, percolation, evapotranspiration, soil-moisture storage, and lateral drainage using a quasi-two-dimensional approach. Volume I contains information on some basic elements of the model, input/output options, and instructions for running the program on the National Computer Center IBM Computer.

The Hydrologic Evaluation of Landfill Performance (HELP) Model: Volume II. EPA Technical Resource Document EPA/530/SW-84/010, PB85 100-832, June 1984.

The second of two volumes on the HELP program, it contains detailed discussions of the theories and assumptions upon which the HELP model is based, the solution techniques employed, and the internal logic of the computer program.

Review of In-Place Treatment Techniques for Contaminated Surface Soils: Volume I, Technical Evaluation. Remedial Action Handbook, EPA/540/2-84/003a, PB85 124-881, September 1984.

In-place treatment technologies applicable to contaminated soils less than 2 feet deep. Volume I discusses the selection of the appropriate in-place technology for a particular site and provides specific information on each technology. Selection of technologies follows the process in the National Contingency Plan. The type of in-place treatment and selection of a specific technology are determined from remedial investigations, assessments of waste, soil, and site-specific variables, and cost-effectiveness.

Review of In-Place Treatment Techniques for Contaminated Surface Soils: Volume II, Background Information for In-Situ Treatment. Remedial Action Handbook, EPA/540/2-84/003b, PB85 124-899, November 1984.

Supports the treatment methodologies described in Volume I. Includes monitoring techniques to determine treatment effectiveness, to characterize and evaluate the behavior and fate of hazardous constituents in soil/waste systems, and on properties of various compounds. This information is intended to help users make more complex decisions and select analyses concerning site, soil, and waste interactions not covered in Volume I.

Slurry Trench Construction for Pollution Migration Control. Remedial Action Handbook, EPA/540/2-84/001, PB84 177-831, February 1984.

This report is intended to provide reviewers of remedial action plans with the necessary background material to evaluate the use of slurry walls to control pollution migration. Information is presented on the history, theory and fundamentals of slurry-wall use; procedures for planning a slurry-wall installation; slurry-wall design and construction practices; methods to monitor and maintain a slurry wall; and evaluation criteria that correspond to the stages of slurry-wall installation.

Covers for Uncontrolled Hazardous Waste Sites. Remedial Action Handbook, EPA/540/2-85/002, PB86 119-483, September 1985. *CERI.*

A technical handbook to aid designers of cover systems and regulatory personnel evaluate cover systems to minimize percolation and leachate formation from uncontrolled hazardous-waste sites. Topics covered include procedures for estimating leachate production from given covers, site specific guidelines for cover designs, and characteristics of contaminated soils.

Leachate Plume Management. Remedial Action Handbook, EPA/540/2-85/004, PB86 122-330, November 1985.

An overview of the fundamental concepts, procedures, and technologies used in leachate-plume management, including plume-generation dynamics and delineation. Plume-control technologies are evaluated and selection criteria for site application are defined. Aquifer-restoration technologies include groundwater pumping, subsurface drains, and low-permeability barriers.

Handbook for Stabilization/Solidification of Hazardous Wastes. Remedial Action Handbook, EPA/540/2-86/001, June 1986.

This handbook provides designers and reviewers of remedial action plans with the information and general guidance necessary to judge the feasibility of stabilization/solidification technology for the control of pollutant migration from hazardous wastes disposed on land. The chemical basis for this technology, the waste characteristics and site considerations which make it appropriate, and the methods for determining its success are all discussed. Four stabilization/solidification scenarios illustrate the strengths and weaknesses of each alternative and offer guidance on processing technologies most suited to specific waste types and site conditions.

Handbook for Remedial Action at Waste Disposal Sites (Revised). Remedial Action Handbook, EPA/625/6-85/006, October 1985. *CERI*

A basic reference tool on remedial action designed to assist in understanding remedial technologies, selecting applicable technologies for a given waste site, and planning remedial action. Technologies are organized by the type of site problem they are intended to remedy (*e.g.*, surface-water controls, ground-water controls). Information on applications, limitations, design, construction, operational considerations, feasibility, and cost are presented for each major technology. Demonstrated technologies are emphasized, but information is also included on emerging technologies.

Underground Storage Tank Corrective Action Technologies. EPA/625/6-87/015, January 1987.

Technologies currently used to correct underground storage tanks that are leaking primarily gasoline and petroleum products, and information for determining state-of-the-art applicability costs and effectiveness of alternative corrective action technologies. Technologies and practices used in other environmental remediation programs were also evaluated for potential use in underground storage tank corrective actions.

Removal of Hazardous Material Spills from Bottoms of Flowing Waterbodies. EPA/600/2-81/137, PB81 230-922, July 1981.

Results of a feasibility study for removing spilled insoluble hazardous materials from the bottom of flowing watercourses. Two full-scale systems are described that were developed to collect spilled materials and contaminated bottom mud, remove excess water from the pumped slurry, and return decontaminated water to the stream. The two systems were successfully demonstrated at a creosote spill on the Little Menomonee River in Milwaukee, Wisconsin.

Feasibility of Commercialized Water Treatment Techniques for Concentrated Waste Spills. EPA/600/2-81/213, PB82 108-440, September 1981.

The suitability and economics of reverse osmosis, ultrafiltration, ion exchange, wet-air oxidation, high-purity oxygen-activated sludge process, ultraviolet-ozone oxidation, and coagulation/precipitation for on-site treatment of concentrated wastes were evaluated from published literature and data obtained from process suppliers. Alone, none of the processes would be economically applicable for on-site treatment of the variety of concentrated wastes encountered, although reverse osmosis, ion exchange, and wet-air oxidation meet many of the application requirements.

Mobile System for Extracting Spilled Hazardous Materials from Excavated Soils. EPA/600/2-83/100, PB84 123-637, October 1983.

Based on laboratory tests with three pollutants (phenol, arsenic trioxide, and PCBs) and two widely different soils, a full scale, field-use system was designed, assembled, and briefly tested for cleansing soil contaminated with hazardous materials. The system includes two major soil-scrubbing components: a water-knife stripping and soaking unit for disintegrating the soil matrix and solubilizing the contaminant from the larger particles (>2mm) and an existing but re-engineered, four-stage countercurrent extractor for freeing the contaminants from smaller particles (<2mm). The processing rate of the system, complete with wastewater recycling, is 2.3 to 3.8 m^3/hr.

Design and Construction of a Mobile Activated Carbon Regenerator System. EPA/600/2-86/015, PB86 156-486, January 1986.

A mobile carbon regeneration unit is described that can be used with mobile activated carbon adsorption units. It is housed in a standard van type of trailer and includes a rotating barrel kiln to thermally regenerate the carbon, an incinerator and scrubber to destroy the desorbed materials and treat the offgases, and a separator to reclaim the reactivated carbon granules. In test runs from the on-site treatment of a spill, the carbon was returned to essentially 100% activity with an 88% volume recovery.

Treatment of Contaminated Soils with Aqueous Surfactants. EPA/600/2-85/129, PB86 122-561, November 1985.

An investigation of aqueous nonionic surfactants for cleaning soil contaminated with PCBs, petroleum hydrocarbons, and chlorophenol. Contaminant removal from the soil was 92% for PCBs, and 93% for petroleum hydrocarbons. While these results are an order of magnitude greater than obtained with water alone, the inability to separate the surfactants from the contaminants for reuse would render the process uneconomical for field application. Future work should investigate the use of other surfactants that may be more amenable to separation.

RISK ASSESSMENT

"Health Risk Comparison Between Groundwater Transport Models and Field Data." Environmental Progress, 5(1):66-70, February 1986.

Methods to predict contaminant migration using both computer modeling and field monitoring data, and case studies comparing health-risk (exposure) assessments and plume delineation based on modeling and monitoring predictions.

Rapid Assessment of Potential Ground-Water Contamination Under Emergency Response Conditions. EPA/600/8-83/030, November 1983. *CERI.*

A rapid assessment method for evaluating potential ground-water contamination from a spill or waste site under a 24-hour emergency-response time frame. The method allows order-of-magnitude estimates of contaminant concentrations with time and distance below the surface. Assumptions and limitations of the procedures, auxiliary sources of information, and example applications are discussed.

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88-322 ENR

CRS REPORT FOR CONGRESS

GROUNDWATER ISSUES AND THE U.S. DEPARTMENT OF AGRICULTURE--AN INSTITUTIONAL PERSPECTIVE

Groundwater contamination is a growing national policy issue, one in which the U.S. Department of Agriculture and the farm community it serves play a prominent role. This paper reviews the evolution of this issue as it relates to the farm community and explores how USDA has responded. It concludes with several options that might be considered to make USDA more effective in dealing with groundwater issues.

Jeffrey A. Zinn
Specialist in Natural Resources Policy
Environment and Natural Resources Policy Division

April 21, 1988

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1. Hold additional oversight hearings on groundwater problems in rural America, examining the ability of the Department and its programs to address them.

2. Take steps to more actively involve USDA agencies in the groundwater question at the local level through such additional activities as soil and water quality testing, education on safer chemical use, and planning farm operations so as to minimize chemical problems. Requiring an annual report on groundwater activities would enable Congress to monitor Department progress and to determine whether additional efforts are needed. Such a report could be appended to the annual progress report on soil and water resources required under the Resource Conservation Act of 1977.

3. Request the U.S. General Accounting Office to undertake a detailed analysis of the effectiveness of current USDA groundwater programs, emphasizing gaps that these programs could fill. The report could also sample related State and local efforts.

4. Require the Soil Conservation Service to include an element on groundwater in its National Soil and Water Conservation Program.

5. In pending appropriations legislation, mandate that the Deputy Secretary will have primary reponsibility for water issues because of its overarching characteristics, and provide adequate funding to staff this expanded responsibility.

SUMMARY

Groundwater and agriculture share a complex direct relationship. This relationship is further complicated by interactions between groundwater and surface water, and by the multitude of agricultural endeavors that have the potential to affect groundwater. Better definition of institutional responsibilities will not decrease that complexity, but it may make it more manageable. At USDA, more or reprogrammed funding would not immediately solve groundwater problems, but it might demonstrate an enhanced commitment. Such a commitment could be reinforced if all the agencies with groundwater responsibilties can be convinced that their interests are best served by a strong and mutually supportive effort. That conviction seems to be present in the Department today; actions by Congress might be considered to help insure that it will remain or be strengthened in the future.

ENVIRONMENTAL AND ENERGY STUDY INSTITUTE

GROUNDWATER PROTECTION: EMERGING ISSUES AND POLICY CHALLENGES

by Judy Campbell Bird

EXCERPTS

MARCH 1985

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alternative supply or relocate and who has to pay the costs of health care, the economic and social impacts from any one incident of contamination are clearly significant.

CURRENT FEDERAL GROUNDWATER PROTECTION ACTIVITIES

Because awareness of the groundwater contamination problem emerged after other major environmental protection issues, portions of the problem are addressed by laws designed primarily to protect other environmental resources from specific sources of contamination. Currently there is no national legislative mandate to protect groundwater.

The laws and regulations have provided incomplete protection, have been inconsistent from program to program and have not been well-coordinated. Federal, state, local and private responsibilities have not been clearly defined. Funding for planning and implementation of groundwater protection programs has been inadequate or non-existent.

The laws are intended to protect the users of groundwater as a public drinking water supply, control contamination from specific sources, control pollution by specific contaminants or clean up already contaminated aquifers. Overall, there are 16 federal laws which have some impact on groundwater protection. These are three of the major ones (See appendix for a complete list):

- The Safe Drinking Water Act (SDWA) provides for standards for safe drinking water; control of the underground injection of wastes; and protection of aquifers which are a community's sole drinking water source from potentially polluting federally-assisted projects.

- The Resource Conservation and Recovery Act (RCRA) regulates hazardous waste disposal and underground storage facilities and requires them to prevent leaching from their sites and to monitor groundwater quality to determine that drinking water standards are not violated. It also provides for state programs to regulate municipal solid waste facilities.

- The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or Superfund, provides for the cleanup of groundwater contamination from old hazardous waste dump sites.

These laws do provide significant protection, and progress is being made. Yet, numerous gaps in current federal groundwater protection programs remain. Current laws do not protect against all major contaminants or major sources of contamination. For example, there are mandatory drinking water standards for only 18 of the over 200 individual contaminants found in groundwater. None of the 23 synthetic volatile organic chemicals found most frequently in groundwater is regulated currently.

Existing programs generally cover only public drinking water supplies, while about 20 percent of the population depend on private drinking water wells. No federal minimum requirements exist for municipal solid waste landfills and disposal sites which receive hazardous materials. Even when groundwater contamination from a hazardous waste disposal site is confirmed, there are no requirements to find and stop the leak or to close the facility until the leak is found and corrected. The Safe Drinking Water Act's sole source aquifer protection provisions apply only to projects that receive federal assistance, not to the federal government's own activities such as military installations. Non-point sources, such as road de-icing salts and fertilizers, remain untouched by federal programs.

Inconsistencies in these programs sometimes lead to conflicts, duplication, deficiencies in protection efforts and differing degrees of protection. For example, there are differences in the way federal laws define the resource to be protected. Four of the programs do not define groundwater at all. Two specify aquifers closest to the surface for protection. Three protect underground sources of drinking water. One divides groundwater into three different categories. Five have an impact on groundwater but do not specifically provide for its protection.

Other inconsistencies include the specific contaminants to be controlled, acceptable levels of contamination, the length of time potential sources of contamination are regulated, types of controls which are used, waivers and variances from requirements, and monitoring and remedial actions required. Four federal laws require notification of spills, accidents or other releases of specified contaminants. With the exception of CERCLA, their emphasis is not protecting groundwater, and each program defines different substances for reporting requirements. The Toxic Substances Control Act requires only initial monitoring for background data on PCB disposal sites. Yet, radioactive disposal sites and hazardous waste sites under the Atomic Energy Act and RCRA are required to monitor during operation and after closure. RCRA provides that allowable concentrations of contaminants can be determined on a case by case basis rather than based upon existing groundwater quality or federal drinking water standards.

ENVIRONMENTAL AND ENERGY STUDY INSTITUTE

SPECIAL REPORT

A CONGRESSIONAL AGENDA TO PREVENT GROUNDWATER CONTAMINATION: BUILDING CAPACITY TO MEET PROTECTION NEEDS

EXCERPT

Oct. 23, 1986

KEN MURPHY, EXECUTIVE DIRECTOR
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COORDINATION OF FEDERAL PROGRAMS FOR GROUNDWATER PROTECTION

The Institute recommends that Congress direct each federal agency to evaluate its policies, programs, regulations and projects for possible impacts on groundwater quality and to make any changes needed to make them consistent with the national goal.

The Institute found three kinds of problems with federal programs. First, there is little if any coordination of environmental programs which have an impact on groundwater quality. This is especially true when these programs are administered by different agencies but is also true within agencies. For example, even though EPA developed a groundwater protection strategy and set up the Office of Groundwater Protection two years ago specifically to promote groundwater protection consistency from program to program, current regulations are not consistent.

The second problem is that some federal policies and programs established for non-environmental purposes can have an impact on groundwater quality. For example, regulations on the transport of toxic chemicals guard against immediate risks to life and property, not groundwater contamination. There has been no concentrated effort to evaluate these programs and take groundwater protection into account.

The third problem is that many federal government facilities and projects are groundwater polluters. Some federal facilities recently have been forced to begin clean-up or containment activities for already contaminated groundwater, but it is unclear what is being done to prevent future contamination.

Based on our findings, the Institute concludes that Congress must provide the impetus for federal agencies to resolve these problems.

Congress should require the agencies to conduct complete evaluations and make necessary revisions. Opportunities for public comment and agency response should be provided in these evaluations and revisions. In some cases, changes in existing laws may be necessary. Agencies should be required to submit recommendations for these changes to Congress.

The Institute recommends, based on our findings and conclusions, that Congress consider establishing an on-going mechanism for coordinating federal work toward the national groundwater protection goal. One option which seems to be working in a few states is a high-level, interagency task force or council responsible for this coordination.

We suggest that such a council:

- Be composed of the heads of all the agencies having major impact on groundwater quality.

- Oversee the agencies' evaluations of their groundwater impacts.

- Recommend to agencies changes in policies, programs, regulations and projects to prevent contamination.

- Be provided a small staff.

- Include technical experts in its deliberations of specific issues.

- Provide for public input into its evaluations and recommendations.

- Be required to report to Congress periodically.

In addition, a public advisory group could be helpful in evaluating programs with groundwater impacts and suggesting changes to the agencies. Such a group should include technical and scientific experts and could be set up like the Energy Research Advisory Board.

Western State Ground Water Management

WESTERN STATES
WATER COUNCIL

October, 1986

WESTERN STATE
GROUND WATER MANAGEMENT

A Report
Compiled and Edited
by
the Staff
of the
Western States Water Council

October, 1986

The Western States Water Council is an organization comprised of representatives appointed by the Governors of fifteen western states. The table of contents on the adjoining page contains a list of these states. Council members are vitally concerned with all matters which affect the management of water resources in the West.

J. William McDonald, Director of the Colorado Water Conservancy Board, is the current Council Chairman. Roland D. Westergard, Director of the Nevada Department of Conservation and Natural Resources, is the Vice-chairman, and Dee C. Hansen, Director of the Utah Department of Natural Resources, is the Secretary/Treasurer. Norman Johnson, Tony Willardson, Pearl Pollick, Marjorie Farmer, Myrna Shuey, and Merrie Brown comprise the Council staff which is directed by Craig Bell.

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INTRODUCTION

The Western States Water Council is an organization comprised of representatives appointed by the Governors of fifteen western states. Council members play an important role in the management of water resources in the West, and ground water protection and allocation have long been among their primary concerns. In October of 1982 the Council published *Western State Ground Water Management*, a report containing a state-by-state summary of the ground water management programs of twelve western states. Much has occurred in ground water management since 1982. The present volume is an update of the previous Council report.

Historically, ground water allocation and protection have been state responsibilities. Notwithstanding this, a number of federal environmental laws directly or indirectly impact the management of ground water resources. These laws differ in scope and approach and, generally, have not been in place long enough to fully gauge their ability to protect ground water. However, at times the lack of coordination and consistency in their implementation has been a problem. In the late 1970's and early 1980's the U. S. Environmental Protection Agency (EPA) authored drafts of a ground water protection strategy aimed at coordinating and directing federal ground water related activities, particularly those carried out under federal statutes. EPA representatives met with members of the Western States Water Council (hereafter referred to as "the Council" or WSWC) and other interested parties, to solicit input on these drafts. In commenting, the Council emphasized the states' primacy in ground water management.

In 1984, EPA published the final draft of its ground water strategy. It affirms the primary state role in ground water matters and establishes a national goal and coordinated management procedures for federal ground water actions. One of its objectives is to improve state ground water management programs. Another is to bridge some perceived gaps in ground water protection. Concomitant with the publication of the EPA strategy came the appropriation of federal grant funds to enhance state programs. Many states have used these funds to refine their ground water protection efforts.

Once the EPA strategy was finalized, efforts to implement it began. These included the publication of a variety of reports. In May of 1985 EPA released *Overview of State Ground Water Program Summaries (Vol. I)* and *State Ground Water Program Summaries (Vol. II)*. EPA has also published reports on ground water research, ground water classification systems, ground water monitoring strategies, and the effect of pesticides on ground water, among a number of other publications such as briefing materials for federally sponsored workshops on ground water protection.

Along with the EPA administrative activities, much has transpired in Congress since the Council's ground water report was published in 1982. The Resource Conservation Recovery Act was amended in 1984 to alleviate some of its inconsistencies in dealing with ground water, to provide some additional protection for the resource, and to create the National Ground Water Commission. More recently, amendments to the Safe Drinking Water Act have established a federal "wellhead protection" program. Under this program, states may choose to accept federal matching grant funds to protect from contamination areas around wells providing water for public water supply systems (defined as any system having at least 15 service connections with 25 individuals). To be eligible to receive funds, States must submit their wellhead protection programs to EPA for approval.

In addition to the legislation enacted, other legislation has been proposed and discussed. S. 1836 (H.R. 3808) which was introduced in November of 1985, would require states to set ambient ground water standards, establish monitoring programs, and create protection programs to control sources of ground water pollution. Also, states would be required to assess ground water resources and develop management strategies. Within two and one-half years after enactment, EPA would be required to set ground water standards for 100 contaminants. Within three and one-half years states would be required to adopt standards at least as stringent as EPA's. Another pending ground water bill is H.R. 3906, entitled the National Ground Water Contamination Research Act. It would enhance and codify the ground water related activities of the U.S. Geological Survey (USGS). Among other things, USGS would be required to identify ground water known to contaminated, thought to be contaminated, or particularly susceptible to contamination.

At least one other major ground water bill may be considered in the near future. Beginning in June of 1985 the Senate Environment Committee's Toxic Substances Subcommittee, chaired by Senator David Durenberger (D-MN), held the first of a series of hearings to gather information upon which to base comprehensive federal ground water legislation. Since that time the Senator has expressed his intention to introduce a comprehensive ground water bill.

Other ground water related activities have underscored the recent re-emphasis on ground water at the national level. A number of ground water publications have been released including: Protecting the Nation's Ground Water From Contamination by the Congressional Office of Technology Assessment, Paula Stone, Project Director; Ground Water Contamination in the United States by Veronica Pye, Ruth Patrick, and John Quarles, University of Pennsylvania Press; Ground Water Protection: Emerging Issues and Policy Challenges by Judy Campbell Bird, Environmental and Energy Study Institute; and, Ground Water Strategies for State Action by Timothy Henderson, Jeffrey Trauberman, and Tara Gallagher, Environmental Law Institute. Another important publication, Ground Water: Saving the Unseen Resource, was written by the National Ground Water Policy Forum, sponsored principally by the Conservation Foundation. Further, some important national groups have recently passed policy statements on ground water management, including the National Governors' Association and the National Water Alliance.

In the midst of this continuing and renewed interest in ground water management, many western state ground water programs have changed significantly since 1982. Some of the changes have been the result of a focused effort to redefine state ground water programs. Others have come as part of the constant refinement of all state programs by state legislators and other policy makers. Given these changes, members of the Council's Joint Ground Water Subcommittee thought it appropriate to update the Council's ground water report.

The update contains information for three additional states, bringing the total number of states included to fifteen. Appendix A contains a list of western state officials responsible for ground water quantity and quality management. Appendix B contains the questionnaire which generated the information upon which the report is based. This information has been provided by state government officials and varies, to some extent, in scope and style from state to state. Hopefully, the most important portions of western state ground water programs are described.

In one sense, this update is somewhat premature. Another one may be necessary in only a few years because of projected changes in some state programs. Nevertheless, the Council believes that, as officials at all levels of government reconsider policy options to refine management and protection of ground water resources, deliberations should occur based on current information. The objective of this report is to provide such information on western state ground water programs.

GROUND WATER IN THE WEST

The importance of ground water in the West may be illustrated by a few observations. First, western states depend on ground water to supply 50% or more of their municipal water needs. In some states the figure is 80% or 90%. Municipal treatment costs for ground water are relatively low because ground water quality is generally high. Further, ground water is the primary source of domestic supply in nearly all rural areas. Also, ground water is often of strategic importance, being available for use when surface sources are not.

Second, ground water is essential to irrigated agriculture in the West. It is the principle source of supply in such important agricultural areas as the High Plains of Texas and other states overlying the Ogallala aquifer, the San Joaquin portion of the Central Valley in California, and much of Arizona. Over 30 million acre feet annually are withdrawn from ground water reserves in these three states alone to irrigate acreage which supports a significant part of the Nation's agricultural production.

Third, ground water is an important source of industrial process and cooling water. For example, ground water reserves have made possible much of the economic development of southern Arizona. Further, ground water is potentially important to the development of alternative energy sources such as oil shale and geothermal gases.

Given present population and development trends in the West, dependence on ground water is likely to increase in the future. However, while demands are generally increasing steadily, supplies are replenished slowly. This creates an important responsibility to carefully manage the ground water resource. A factor which intensifies this responsibility is that, in the West, nearly all activities which affect ground water management also directly affect constitutionally protected private property rights to use ground water. Such rights are created based on four basic legal theories or doctrines. Western state water laws utilize one or a combination of these doctrines and/or the principles upon which they are based. They are as follows.

The doctrine of absolute ownership provides that ground water is appurtenant to land and is therefore the property of landowners who can, essentially, withdraw and use as much water as they can extract. The reasonable use doctrine provides that, while the landowner owns water under his land, he may only use the amount of water which can be reasonably applied to benefit the land from which the water is taken. The correlative rights doctrine is similar to the reasonable use doctrine. However, when a shortage occurs, landowners are entitled only to an amount proportionate to the land area they own over the common water supply.

The doctrine of prior appropriation, unlike the other legal theories, is not founded upon proprietary interest in land. Rather, it is based on beneficial use of water. In an appropriation doctrine state, the first user to put water to a beneficial use is protected in that use. A chronological hierarchy among appropriators is established whereby initial users receive priority rights over subsequent users. The limit to the right is the legislatively defined beneficial use. This use may occur off from the land overlying the ground water. As mentioned, the appropriative right is a constitutionally protected property interest. Most western states use the doctrine of prior appropriation to administer rights to ground water.

Most western states also use some type of permit system in sanctioning and administering ground water use. Such permitting is particularly important in designated ground water basins. Most states license water well drillers and have well construction standards. Small wells, such as those for domestic and stockwatering purposes, are often exempted from many administrative and legal requirements. These, and other matters of importance, are discussed in the state-by-state summary which follows. Among the other issues considered are: (1) the protection of ground water users' means of diversion; (2) conjunctive use of ground and surface water; and, (3) protection of ground water quality. There are different legal and administrative means of dealing with these issues.

For example, subsequent ground water users may be enjoined from lowering the water table to a point that prior users are adversely affected. In the alternative, they may be required to compensate senior appropriators for any additional costs which the prior users incur in order to exercise their ground water rights. With regard to conjunctive use, ground water supplies may be augmented by artificially recharging aquifers, using surface water which may be imported and spread to percolate downward or directly injected. Such action may be taken either as a remedial step to resolve overdraft or to enhance storage and distribution systems. Ground water aquifers, like surface reservoirs, may be used to conserve water for future use. Local water districts in southern California, for example, actively promote the conjunctive use of ground and surface waters in this manner. Conjunctive use also entails the administrative recognition of the interrelated nature of ground and surface water supplies and the unified administration and management of rights to use each. This kind of management is in place in many western states.

In some areas in the West increased demand for ground water has led to ground water overdraft or mining. Within the foreseeable future, some western ground water aquifers could be drawn down to the point where water will not be economically recoverable. In some areas where mining occurs ground water is viewed as a nonrenewable resource, and, under some circumstances, mining may be the most economically efficient solution to water supply problems. In other areas, steps are being taken to remedy overdraft problems by curtailing use and/or augmenting supply.

Ground water contamination is also a problem with potentially serious consequences. It may be caused by numerous human activities including mining, agriculture, petroleum and natural gas production, waste disposal, and leaks and spills from underground storage tanks. Future growth and development will increase the threat of ground water contamination. Unlike surface water, the natural restorative processes for ground water may take generations. Treatment, or artificial restoration, is difficult and expensive at best, and is often technically or economically impracticable.

Western states have developed formal and informal mechanisms for coordinating ground water allocation and ground water quality goals. Many of the states often review and revise their ground water programs in view of evolving needs.

All western states have acted based on their general police powers to control ground water pollution to protect the public health and welfare. Most have established policies and procedures which protect ground water by regulating surface water quality and various waste disposal practices. With respect to quality management and pollution prevention, the western states utilize a variety of methods in their ground water programs. Specific preventative measures include effluent limitations, land use planning, monitoring requirements, protection of recharge zones, and mandatory management practices regarding sources of pollution. Also employed are techniques such as use of ambient ground water standards and enforcement of specific requirements on potential dischargers of pollution. Most states also have emergency powers which are utilized as needed.

An increasing number of states have or are developing comprehensive legislative authority and administrative regulations to address ground water management. In some cases this has amounted to consolidating existing authority into a more manageable package. In other cases new legislation has been enacted. In general, land use planning authority and related ground water protection measures have been delegated by the states to local governments. In some instances, state ground water management and protection efforts have been hampered by a lack of technical and financial resources.

The states also have authority to protect ground water under a number of federal laws such as the Clean Water Act (CWA), Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response Compensation and Liability Act (CERCLA or "Superfund"), and the Safe Drinking Water Act (SDWA), specifically the Underground Injection Control Program (UIC).[1] Where states have not been delegated primacy under these laws and programs, federal agencies carry out responsibilities which protect ground water resources.

The western states have tailored their ground water management efforts to meet specific needs. These needs vary from state to state and may be different from those in other states in the Union. Site and situation specific management practices are most effective in protecting ground water quality. State and local programs are best able to carry out such practices.

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[1] These acronyms, as well as EPA for the United States Environmental Protection Agency, USGS for the United States Geological Survey, and NPDES for the National Pollution Discharge Elimination System program, are used throughout the text.

STATE GROUND WATER MANAGEMENT PROGRAM SUMMARIES

ALASKA

In Alaska, ground water is a major water source for a variety of uses including public, industrial, and private or domestic water supply systems. In many of Alaska's more developed areas, ground water is the principle water source because of its accessibility, particularly during winter months when surface water is frozen. Also, much of the surface water in Alaska requires treatment to remove significant amounts of very fine glacial "flour."

Alaska faces a number of challenges related to ground water use and development. The most significant problems include salt water intrusion in the Juneau area, arsenic concentrations in Fairbanks and other interior areas, contamination of ground water by hydrocarbons in several areas, and a decrease in the static water level in municipal and private wells in the Anchorage area. Some of these problems appear to have resulted from over development and excessive use. Another challenge, somewhat unique to Alaska, is that in many areas of the interior and northern regions of the State "permafrost" is a serious impediment to the development of ground water as a viable source of supply.

Ground Water Allocation

Alaska is a prior appropriation doctrine state as dictated by the Alaska Constitution Article VII, Section 13, and water rights for both surface and ground water are administered under the Alaska Water Use Act according to prior appropriation principles. The Constitution reserves all surface and subsurface waters "to the people for common use."

Alaska law requires the State to protect prior appropriators in their right to water use, and permits and certificates to appropriate can be conditioned accordingly. If there is reason to believe that a new applicant's proposed use may affect prior appropriators, the Alaska Department of Natural Resources (DNR) may require pump tests and hydrologic analysis. The DNR Commissioner can issue a cease and desist order to a person interfering with a lawful appropriator.

The Alaska Water Use Act requires that the Department of Environmental Conservation (DEC), the State agency responsible for water quality management, be notified and given opportunity to comment on applications to appropriate water. This is the primary mechanism to coordinate water allocation and water quality concerns.

Under the State's system for allocating rights to ground water, DEC, the Department of Fish and Game, and the general public are given the opportunity to comment on applications for water rights. This system has functioned efficiently, and given the State the opportunity to make a unified evaluation of withdrawals from both surface and ground water sources. Also, the State has evaluated the effect of the withdrawals on certain hydrologic systems.

Ground water mining is not legally defined in Alaska. However, the State is able to prohibit such mining by creating a critical ground water management area and by prohibiting the drilling of new wells within the area and/or limiting the use of water from existing wells. An example of this is the Auke-Nu Indian Cove Critical Ground Water Management Area.

Public water supply is the only preferred use in Alaska. However, preferred use status will not be granted until compensation has been agreed to or a bond posted. Alaska does not license well drillers. However, well construction standards are regulated under state law by DEC and DNR. Alaska has no artificial recharge program for augmentation of aquifer storage.

Ground Water Quality

The Alaska DEC has been designated by the Governor to coordinate the development of a statewide ground water quality protection program. The Division of Environmental Quality (DEQ) within DEC has the responsibility for prevention of ground water pollution related to wastewater disposal, oil pollution control, drinking water, underground storage tanks, pesticides, solid waste, and hazardous wastes.

In June 1986, DEC initiated the development of a ground water protection program with EPA Section 106 funding. The initial task is to evaluate existing State, federal, and local regulations, laws, and ordinances to determine the present degree of ground water quality management in Alaska. From this review, DEC will begin to develop: (1) a coordinated approach toward the protection of the ground water resource; and, (2) an interagency ground water quality protection program.

The Alaska water quality standards, which include designated uses and criteria for ground water, are the bases for the ground water pollution control program. The standards are used to establish limits in permits for discharges to ground water and other activities with potential to affect ground water quality. In addition to water quality standards, the program maintains wastewater disposal regulations which specifically address treatment of domestic sewage. Certain portions of these regulations are aimed at protecting ground water quality.

In December of 1985 the Alaska DEQ applied to the U.S. EPA for funding of leaking underground storage tank prevention activities and DEQ's oil pollution control program. Program staff have begun Phase I of the program, consisting of required notice and inventory of underground petroleum facilities in Alaska.

The drinking water program regulations include provisions for protecting sources of public drinking water, whether surface or ground water. While the program emphasizes the safe treatment and delivery of potable water, activities such as reviewing plans and inspecting installations to insure that wells are not contaminated protect some ground water sources.

The hazardous waste management program under RCRA currently operates under the authority of a cooperative agreement with EPA, carrying out inspections and drafting enforcement recommendations. In cooperation with EPA, the Department is carrying out preliminary assessments of 45 sites in Alaska at which potentially hazardous wastes have been improperly disposed. About 16 of the sites will be thoroughly investigated in 1986, with an additional 25 sites during 1987.

The Alaska DNR has a number of statutory tools available to address specific ground water contamination problems. One is to withhold permits or certificates of appropriation based on an adverse public interest finding. Another is to close a specifically defined ground water area to additional water development and use.

The Alaska DNR bears primary responsibility for the collection and interpretation of ground water data, both quantitative and qualitative. The Division of Geological and Geophysical Surveys carries out the responsibility in cooperation with the USGS and various other agencies, maintaining current data on over 10,000 public utility, industry, and domestic wells. The Division's efforts provide technical information for the management of aquifers subject to moderate to severe development pressure. Active programs monitoring ground water quantity, and to a lesser extent quality, are underway in Anchorage, Eagle River, Juneau, Houston, and on the Fairbanks uplands.

Alaska has not adopted a procedure for formal ground water classification. However, the State has developed a procedure to designate critical water management areas for both ground and surface water. Under this process the State can limit or restrict use and development of certain water sources and thereby address a number of quantity and quality related concerns.

The Alaska Oil and Gas Conservation Commission administers the federal UIC program governing Class II injection wells. EPA approved delegation of authority in June of 1986.

ARIZONA

Ground water is a valuable resource in Arizona, supplying over 60% of the State's water uses. Arizona's primary water problem is the imbalance between the amount of water consumed and the dependable supply. Average yearly ground water withdrawals exceed the amount replenished by approximately 2 million acre-feet. Over the years, ground water overdrafting has resulted in a lowering of ground water levels by as much as 400 feet, making ground water use economically infeasible in some areas. Ground water quality has been reduced significantly in some areas of the State, as water is pumped from greater depths. Ground water depletion has resulted in land subsidence and several earth fissures, causing damage to roads, buildings, and underground utility lines.

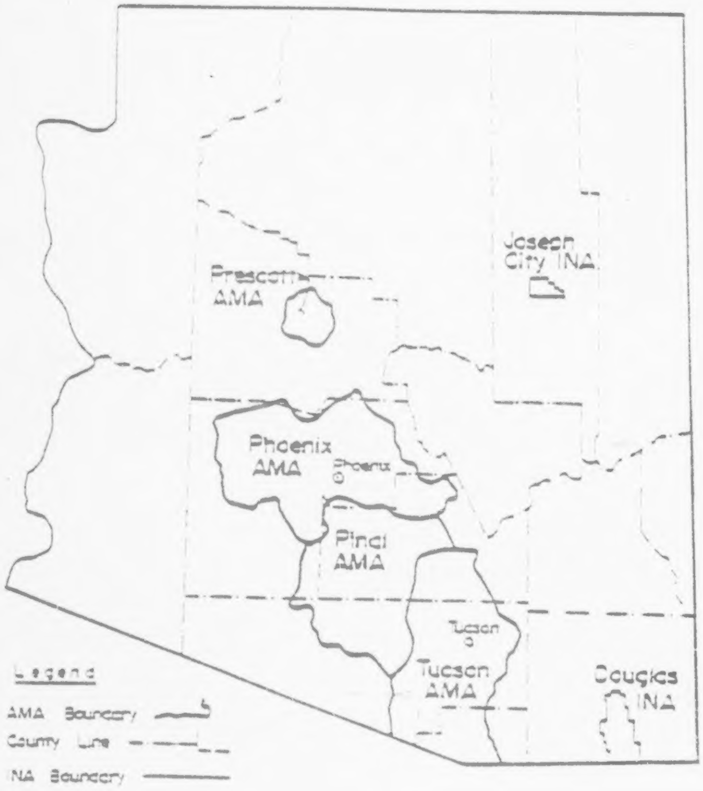
Ground water pollution is also a serious problem in Arizona. Aquifer contamination by organic compounds, industrial solvents, and heavy metals has forced the closure of several municipal water supply wells in the Tucson and Phoenix areas.

Two State agencies are responsible for managing Arizona's ground water quantity and quality. Protection of ground water quality is primarily the responsibility of the Department of Health Service. On July 1, 1987, these responsibilities will be transferred to the newly established Department of Environmental Quality. The Department of Water Resources regulates ground water withdrawals and allocations. However, when ground water is contaminated, the Department of Water Resources is also the lead technical agency for conducting remedial investigations.

Ground Water Allocation

The Department of Water Resources (ADWR) was created in June of 1980 with the enactment of Arizona's Ground Water Management Act. The Act included a comprehensive new ground water code with two primary goals. The first is to control the severe overdraft of ground water currently taking place in many parts of Arizona. The second is to provide a means to allocate the State's limited ground water resources to most effectively meet the changing needs of the State.

The ground water code established four active management areas (AMAs) where ground water overdrafts are the most severe. Other AMAs may be established later by ADWR or by election by local water users. Intensive management of ground water is required in AMAs, and ADWR has the authority to formulate and enforce water management plans, including mandatory conservation requirements for all water users. In addition to the AMAs, three Irrigation Non-Expansion Areas (INAs) were established . Ground water management is less aggressive in INAs. The principal management tool in INAs is a ban on new irrigated acreage. Outside of AMAs and INAs there are few legal restrictions on the development of ground water resources. Figure I shows the AMAs and INAs.


Prescott AMA
Joseph City INA
Phoenix AMA
Phoenix
Pinal AMA
Tucson
Tucson AMA
Douglas INA
Legend
AMA Boundary
County Line
INA Boundary

ACTIVE MANAGEMENT AREAS
IRRIGATION NON-EXPANSION AREAS

FIGURE 1

Within AMAs the code establishes three different rights to withdraw ground water. They are:

(1) Grandfathered rights for all existing users based on historic use rates.

(2) Service area rights for water providers such as cities, towns, private water companies, and irrigation districts.

(3) Ground water withdrawal permits for new specific non-irrigation uses.

The management goal for the three urban AMA's -- Phoenix, Tucson and Prescott -- is safe-yield. This means that, by the year 2025, ground water withdrawals may not exceed recharge. In the Pinal AMA, where a primarily agricultural economy exists, the goal is to extend the life of that economy as long as feasible, consistent with the need to preserve future water supplies for non-agricultural uses.

To reduce ground water withdrawals, the code requires the ADWR to develop a series of five management plans for each AMA. In addition to setting mandatory conservation requirements for agricultural, municipal, and industrial water users, the plans will include programs for augmenting existing water supplies through techniques such as artificial ground water recharge, flood water utilization, wastewater reuse, weather modification, and watershed management. Additionally, after the year 2006, the Department may purchase and retire grandfathered rights if necessary to meet the management goals.

The first ground water management plans, now in effect, extend to 1990. Water users and distributors are required to comply with the plan's water conservation requirements by January 1, 1987, except in the Pinal AMA where the compliance date is January 1, 1988.

Several other ground water code provisions enable ADWR to efficiently manage ground water withdrawals. All ground water users within the AMAs and INAs are required to install water measuring devices and annually report pumpage. To protect prior ground water users in AMAs from damage due to unreasonable well drawdown, a well spacing analysis is required prior to the drilling of all new wells. Additionally in AMAs, the code bans new irrigated acreage and requires developers to demonstrate a 100-year assured water supply prior to offering lots for sale.

ADWR has the authority to enforce the code's provisions and the conservation requirements stipulated in the management plans. The Department may issue cease and desist orders. Violation of the code or the management plans can result in criminal penalties or civil penalties of up to $10,000 per day of violation. Audits, inspections, and reviews are conducted to insure compliance by ground water users.

Ground water management programs are now financed primarily through Arizona's general fund. However, the cost of managing the State's ground water resources is shared by the water users. A ground water withdrawal fee of up to $1 per acre foot may be levied to cover up to 50% of the costs of administering and enforcing the code. Additional fees of up to $4 may also be assessed to fund water supply augmentation programs, and retire grandfathered rights. The withdrawal fee for calendar year 1986 is $1.00, with an additional 50 cents per acre foot being collected in parts of the Phoenix AMA for a special study and in the Tucson AMA for an augmentation program.

In 1986, the Arizona legislature established a regulatory program for recharge and underground storage and recovery projects. A recharge project is a project designed to replenish the ground water supply. The sponsors of a recharge project would not be entitled to recover the recharged water. An underground storage and recovery project is a project designed to store water underground for future recovery and use. A person who seeks to operate either type of project must obtain a permit from ADWR.

Ground Water Quality

The Arizona Department of Health Services (ADHS), Environmental Health Division, is authorized and obligated under State statutes to adopt standards to protect the waters of the State from excessive degradation. EPA funds approximately 54% of ADHS environmental programs. The remaining programs are financed primarily by State appropriations.

ADHS may review and approve facility plans and specifications, and establish permit conditions and criteria for the construction, operation, and monitoring of facilities which may pollute waters of the State. ADHS also controls the quality of reused wastewater, and the conditions under which it may be utilized, through an effluent reuse permit process.

A ground water quality protection program was adopted in July, 1984. The program established ground water quality standards and a permit system for discharges to waters of the State. This program has been revised and strengthened by legislative action in 1986.

The 1986 legislation establishes, as of July 1, 1987, a new State agency, the Department of Environmental Quality (DEQ), to administer the State water quality programs as well as State programs for air quality, solid waste, and hazardous waste. The Environmental Health Division of ADHS will begin implementation of the new legislation, but ultimately the responsibility for carrying out the legislation will be transferred to DEQ.

The 1986 legislation provides authority to regulate the quality of all waters of the State. The legislation eliminates the exceptions for certain types of water that existed under prior law. Many of the significant changes in the legislation involve protection of ground water quality.

The 1986 legislation creates an aquifer classification system. Under the system, all aquifers are initially classified as drinking water aquifers, but, if certain criteria are met, all or part of an aquifer may be reclassified for another use. When the new legislation took effect in August of 1986, the existing numeric primary drinking water standards adopted by EPA became the standards for the aquifers. The Director of DEQ must generally adopt any new primary drinking water standards established by EPA and may set other numeric aquifer standards.

The aquifer protection permit system established by the legislation is the primary mechanism for maintaining ground water quality. To receive an individual aquifer protection permit, a facility must demonstrate that its discharges will not violate the aquifer standards and that it will employ the "best available demonstrated control technology" (BADCT) to minimize discharges. BADCT includes, where practicable, a no discharge technology.

The legislation also creates a second type of aquifer protection permit -- general permits. The general permits apply to classes of facilities, such as residential septic tanks, where it has been determined that the cost of individual permits is not justified by the benefits received. A general permit will be established by rule and will prescribe the conditions of operation for all facilities in a particular class. Implementation of best management practices may be required as a condition of a general permit. General permits are the exclusive type of permit for certain agricultural activities.

The legislation provides criminal penalties, including felonies, and civil penalties of up to $25,000 per day of violation. The citizen suit provision permits citizen suits against violators or against the Director of DEQ for failure to perform a non-discretionary duty. The legislation also establishes a water quality assurance revolving fund which may be used to match Superfund monies and to pay for State cleanup when the responsible party fails or refuses to clean up or can't be identified.

Submittal of a waste discharge plan has been required under the Arizona Groundwater Protection Program adopted in 1984, for all facilities or activities (regulated by ADHS) which may potentially discharge waste to waters of the State. A similar plan will be required under the new legislation. The plan describes how facilities will operate within the program's goals, policies and standards. Waste discharge plans must also address the eventual abandonment of the facilities and assure that no further discharge will occur, or that measures will be taken to ensure that discharges will not contaminate ground water to the point where existing uses are impaired. Abandonment plans may require amendment in accordance with state-of-the-art improvements.

ADHS regulations provide for general waste discharge permits to be issued to groups of facilities or activities that have minimal individual and cumulative impacts on ground water quality, or can be managed under broad management plans. Facilities or activities issued a general permit are not required to file a waste discharge plan.

Permits establish discharge limits or the conditions necessary for a facility to comply with the standards. The permits are legally enforceable contracts between the facility and the Director of ADHS, providing the means for implementing the ground water quality standards.

The permit process is well defined, with requirements and criteria for permit application and issuance, facility operation, monitoring, reporting, denials, appeals, and public participation.

Department of Health Service regulations and policies control the construction and operation of injection wells, sanitary landfills, and hazardous waste disposal sites. A State owned hazardous waste disposal site has been selected according to legislated guidelines. Construction will begin when permits are finalized.

CALIFORNIA

Ground water management is a major issue in California with water quality as the principal sub-issue. A Department of Water Resources (DWR) report (DWR Bulletin 118-80) identified nearly 400 ground water basins in the State. Eleven were determined to be "subject to critical conditions of overdraft." (see Figure II). Further, public hearings pointed out that ground water overdraft is widespread in other basins. Most of the critical basins are located in the San Joaquin Valley portion of the Central Valley. Ground water pumped in the Central Valley totals about 19B gpd, which is equivalent to almost 25% of that pumped daily in the entire nation. The annual overdraft is estimated at over one and one-half million acre feet, and declining water levels are causing increased pumping lifts and, consequently, higher energy costs. Water quality problems include sea water intrusion, increased salinity and nitrates due to agricultural and municipal uses, and some localized contamination from chemicals, pesticides, underground storage tanks, and waste disposal sites.

California is believed to produce the fourth greatest amount of hazardous waste nationwide. Practices such as landfill, ponding of liquid hazardous waste, land-farming, injection wells, waste piles and other land applications have been used to dispose of approximately 85% of the estimated 10 million tons of hazardous waste material generated each year in California. The public is very concerned about eliminating pollution problems caused by inadequate disposal of hazardous waste.

Preliminary screening of ground water supplies for domestic use show significant numbers which violate health standards. Underground tanks numbering in the hundreds of thousands are being inspected with more than a quarter of these estimated to be leaking.

The State of California deals with ground water quality problems through a multitude of agencies. The agency most often in the lead is the State Water Resources Control Board. The California State Water Resources Control Board is responsible for both water rights administration and water quality management. The State Board is further represented by nine Regional Water Quality Control Boards for water quality management. The Department of Agriculture plays a key role in the "permitting" of agricultural chemicals, a major source of pesticides. When domestic water supplies are considered, the Department of Health Services (DHS), with the county governments, play the major role in closing wells and identifying sources of contamination. DHS also has a role in the cleanup process. Some injection wells are regulated by the Department of Conservation. The Department of Water Resources has historically been the hydrogeologic investigator and has collected hydrologic and water quality data for many decades. The Solid Waste Management Board has a role in the ground water quality arena. Efforts have been underway the past two years to create a super-agency to manage toxic wastes.

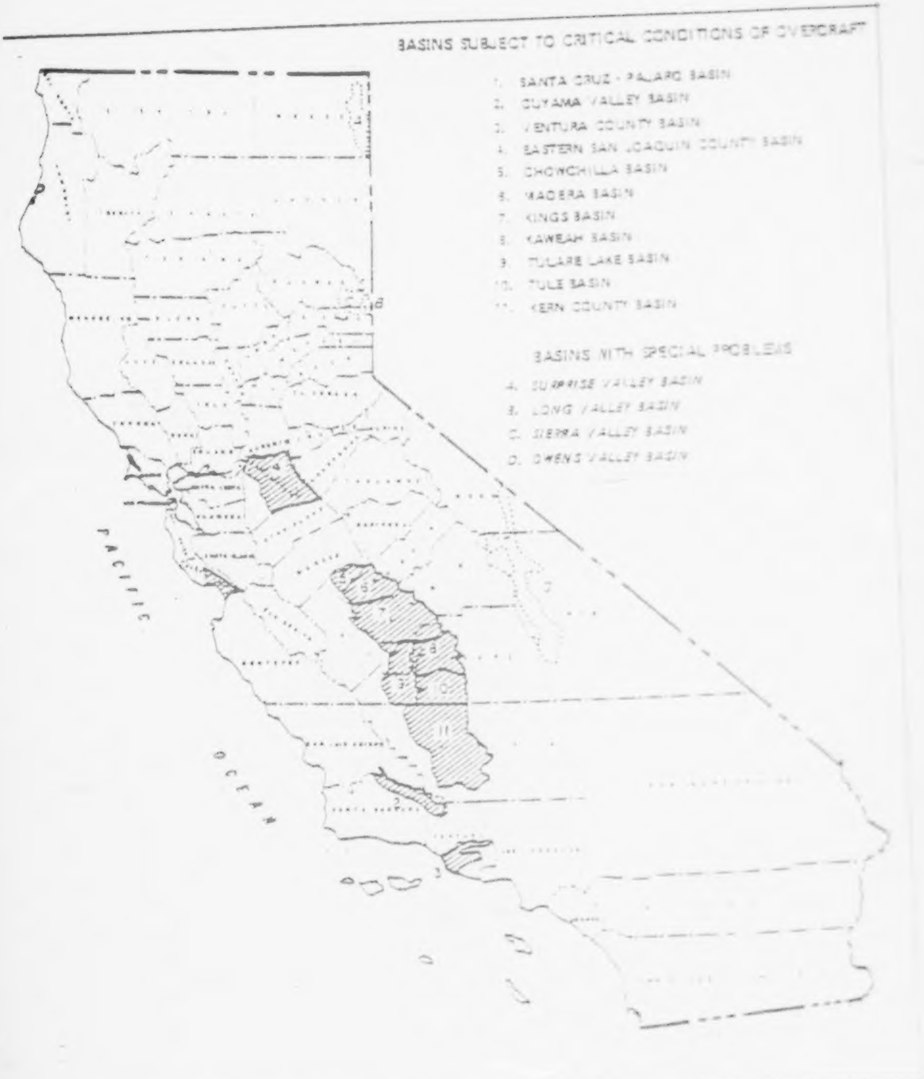

BASINS SUBJECT TO CRITICAL CONDITIONS OF OVERDRAFT
1. SANTA CRUZ - PAJARO BASIN
2. CUYAMA VALLEY BASIN
3. VENTURA COUNTY BASIN
4. EASTERN SAN JOAQUIN COUNTY BASIN
5. CHOWCHILLA BASIN
6. MADERA BASIN
7. KINGS BASIN
8. KAWEAH BASIN
9. TULARE LAKE BASIN
10. TULE BASIN
11. KERN COUNTY BASIN
BASINS WITH SPECIAL PROBLEMS
A. SURPRISE VALLEY BASIN
B. LONG VALLEY BASIN
C. SIERRA VALLEY BASIN
D. OWENS VALLEY BASIN
PACIFIC
OCEAN
4
5
6
7
8
9
10
11
1
2
3
B
D

FIGURE II BASINS SUBJECT TO CRITICAL CONDITIONS OF OVERDRAFT OR WITH SPECIAL PROBLEMS

With the State Board as lead agency, work is progressing on the development of a ground water quality protection strategy for California. Agencies having a role in ground water quality are participating on a coordination committee, advising the State Board in this activity.

Financing of state and regional board water quality programs comes from the State of California general fund, waste discharge filing fees, and federal sources. Additionally, state bond funds, which have been approved by the voters, may be used for water quality planning. Ground water investigation and planning is carried out by the Department of Water Resources with general funds, and when work is for the State Water Project, with project funds. Much of the ground water investigation activity is cooperatively funded with local water agencies, counties, and other state and federal agencies. Further, many local agencies also carry out studies on their own. Department of Health Services programs are supported with general funds and EPA safe drinking water grants.

Ground Water Allocation

California has no ground water appropriation codes. Virtually all underground water is presumed to be percolating and, absent proof to the contrary, is generally subject to the correlative use doctrine. In Katz v. Walkinshaw 74 P. 766 (1903), the California supreme court abandoned the common law doctrine of absolute ownership and adopted the rule of correlative use, which gives overlying owners common rights to percolating waters beneath their lands. Each owner is limited to the reasonable use of water to meet his beneficial needs, subject to similar rights for all other overlying landowners.

The correlative right is an appurtenance to the land and is not dependent on use. Neither does an overlying user obtain any priority over adjacent overlying users solely by pumping first from the common supply. It is a private right, not a public right, but it is subject to limitations on reasonable, beneficial use and reasonable means of diversion to prevent waste. Of course, when supplies are sufficient, each owner's withdrawals are unrestricted. Further, underground water in excess of the needs of all overlying landowners may be appropriated and exported outside the basin of origin without a permit from the State.

In overdrafted basins, withdrawals in excess of recharge are intrusions upon the rights of overlying owners, but the courts have held them to ripen into prescriptive rights if continued for the requisite period of time (5 years), even though there is no present damage to water uses. The overdraft has been held to be mutually prescriptive to all overlying rights, but while past adjudications have relied on this doctrine of mutual prescription, it may not be used in the future since a state supreme court decision rejected its use as improper (see Los Angeles v. San Fernando 14 Cal. 3d 199 (1975)).

California courts have also held that an overlying owner has the right to protect his prospective use against an established appropriation, except insofar as the appropriative claims ripen into prescriptive rights. Overlying users may protect their rights against loss by prescription before a basin is overdrafted by obtaining a declaratory judgment establishing their paramount right against nonsurplus appropriations. Subsequently, the overlying user could obtain injunctive relief when overdraft begins. In addition, an overlying user can retain his right to the proportionate share of the safe yield by exercising it by pumping at any time during the prescriptive period. Case law is not clear as to whether or not overlying rights which have never been exercised can be lost by prescription, though there are some indications this may be possible if an overlying landowner has not acted to protect or exercise his right.

Mining is not defined by state statute, nor may the State prohibit mining of ground water, except that the Water Resources Control Board may exercise its authority to enjoin withdrawals to prevent destruction or irreparable injury to ground water quality. The Board is authorized by statute to initiate a court adjudication of ground water rights to protect water quality. Acting upon the recommendations of the Department of Water Resources, or investigations by any governmental agency, the Board may hold a public hearing on the necessity of restricting ground water pumping to protect water quality from irreparable injury. Subsequently, it may file an action in the superior court to restrict pumping and/or impose other physical solutions to the extent necessary. A California appellate court decision held that where all parties in a ground water basin adjudication are overlying owners using the water for overlying uses, the mutual prescription doctrine does not apply. Rather, the rights of overlying users must be calculated based on the correlative rights doctrine, where "if the quantity is insufficient each is limited to his proportionate fair share of the total amount available based on his reasonable need." (see Tehachapi-Cummings County Water District v. Armstrong, 49 Cal. App. 3d 992, 1000 (1975)).

With respect to non-overlying uses, the courts have indicated that prior appropriation principles should be applied (i.e., first in time is first in right), and appropriate rights can be lost by prescription.

There do not appear to be any court decisions which directly involve the question of whether an overlying user can protect his means of diverting or extracting ground water against the actions of other overlying users. No protection has been provided against the lowering of ground water tables except through adjudication of rights in the entire basin. Even then, though the rights may be defined, damages will not necessarily be assessed. The State Water Resources Control Board has the responsibility of recording all underground water extractions in four counties in southern California for the possible future definition of ground water rights by adjudication. Presumably, where rights have been adjudicated, the accumulated overdraft will not be allowed to increase, and therefore, existing means of extraction will be protected indirectly. The courts have affirmed the overlying user's right to protect his reasonable means of diversion against pumping by an appropriator whose pumping lowers the ground water levels in the overlying users wells to the extent that he is "unable to obtain by his pump sufficient water therefrom for use upon his lands...." (see Burr v. Maclay Rancho Water Co., 98 P. 260, 264 (1908))

Well drillers are licensed by the State, as are all other contractors. Well standards are a primary responsibility of the individual counties with the Department of Water resources providing technical advice in the form of model well standards. Thirty-seven of the fifty-eight counties have adopted ordinances containing these standards. Enforcement of these ordinances varies.

Ground water basins are often managed by local water districts. Selected basin strategies are shown in the figure on the next page.

Artificial ground water recharge programs, and the conjunctive use of ground and surface waters, are not new in California. The flood waters of San Antonio Creek, in Los Angeles County, have been impounded and spread since 1895. Local water agencies artificially recharge nearly two million acre feet per year in their own areas. Further, conjunctive operation of the State Water Project has been envisioned since 1957 by the State water plan. However, the State is not directly involved in either artificial recharge or conjunctive use activities. The State has supported local ground water management activities, including conjunctive use, and the State has negotiated with local water agencies to store State Water Project water in local ground water basins in order to increase project yield. Demonstration projects exist in two basins in Southern California.

The State has not appropriated artificially stored ground water. In Los Angeles v. San Fernando, the court held an importer's right to recapture imported ground water was of the highest priority, equal to the priority accorded Pueblo ground water rights. Further, the case was used as a precedent for utilizing ground water basins instead of surface reservoirs whenever practical, while implying that the storage of water underground must not interfere with a basin's ground water supply. A priority system has not been established for the use of ground basin storage space.

Ground Water Quality

The Porter-Cologne Water Quality Control Act of 1969 established nine regional water quality control boards with broad authority to deal with water quality problems. Each board is composed of nine members, who meet regularly. Each board has a full-time staff. A regional board has authority to initiate enforcement actions against specific dischargers, levy monetary fines, and require remedial action. In certain situations, a board may perform needed remedial work itself. The boards also prescribe waste discharge requirements for anyone discharging or proposing to discharge waste where it may affect the quality of the waters of the State, which includes ground water. Waste discharge requirements are embodied in a State permit that regulates the discharge to assure protection of beneficial uses of the water through establishment of effluent limitations, conditions of discharge, and monitoring programs. Waste discharge requirements can be issued for both point source and non-point source discharges. In addition, the regional boards and the State Board adopt water quality control plans ("basin plans") which establish water quality objectives for receiving waters, and regional boards prescribe waste discharge requirements to implement the plans.

Basin plans have been adopted for the entire state. In adopting these plans, the State and regional boards are required by statute to consider the following factors: beneficial uses, environmental characteristics and quality of water available in the particular hydrographic unit, reasonably achievable water quality conditions, economic considerations, and the need for housing development in the region.

The State Water Resources Control Board formulates and adopts state policy for water quality control. As previously described, the Board also has authority to adjudicate ground water rights to protect ground water quality. The California constitution also speaks to the prevention of waste or unreasonable use of water. This is generally construed as an additional authority for the State Board to act to protect the quality of waters of the State, including ground water from appropriations which impair water quality. The State Board has adopted a policy to maintain, to the maximum extent possible, the existing quality of water where it is better than established water quality standards. A certain degree of degradation may be permissible under this policy in certain areas when viewed from a statewide perspective of maximum benefit. The concept of acceptable risk is implied in this basic policy.

The State Board and regional boards have also been delegated the authority to administer the National Pollutant Discharge Elimination System originating in the CWA, as amended.

The Department of Health Services has emergency authority under the general provisions of the State Health and Safety Code to remove from the supply any well that is contaminated, i.e., water exceeds the adopted standards for drinking water, or exceeds the accepted action level for constituents for which standards do not exist. If closing the well is impractical, boiling of water or use of bottled water may be ordered. The Department of Health also restricts the recharge of reclaimed waste water.

California has only accepted the (Class II) portion of the federal UIC program relating to oil and gas enhanced recovery. It is administered by the Department of Conservation, Division of Oil and Gas. The State Water Resources Control Board has jurisdiction over the other types of injection wells through its water discharge requirements. The Department of Health Services also has jurisdiction where hazardous wastes are involved. Both the State Board and the Health Department can prohibit the disposal of waste through deep injection wells.

The federal program prohibits construction of an injection well until a permit has been issued containing construction requirements. Legislation passed in 1985 requires submission of a report of waste discharge, so that waste discharge requirements may be issued establishing construction requirements before construction of the injection well begins. In addition, injection of waste to any wells is not allowed without waste discharge requirements, and because of the risk and costs involved in drilling a well, dischargers usually wait for waste discharge requirements prior to construction in order to assure that the well may be used.

A problem with delegation in California exists because of provisions in the federal UIC regulations allowing an aquifer to be exempt from water quality restrictions. The State is debating whether or not any aquifer should be exempted, and if so, what criteria should be used. State law does not permit designation of waste disposal or waste assimilation as beneficial uses of aquifers. However, some waters may be used for waste disposal or waste assimilation if designated beneficial uses would not be adversely affected.

A complete inventory of injection wells in California is currently underway to assure accurate figures on the number and type of injection wells. Present records indicate 27 actual or proposed Class I injection wells, 7,609 active and 2,402 inactive Class II wells, 49 Class III wells, 5 Class IV wells, and an estimated 15,000 Class V wells. There is no conclusive evidence that drinking water supplies are being contaminated through injection well practices. However, the State is concerned with protecting future beneficial uses, including industrial and agricultural uses, as well as drinking water supplies.

The State has not adopted any land use controls to protect ground water, but areawide management plans, adopted under CWA Section 208, can provide some authority to protect ground water.

Under statutory authority, the State Board has adopted regulations dealing with the land disposal of wastes. Basically, three classes of disposal sites are established. Class I sites accept hazardous wastes and rely on both complete containment and stringent siting criteria. Class II sites accept wastes with non-hazardous soluble components that could cause violations of water quality standards. These sites require full containment, but have less stringent siting requirements than Class I. Class III sites accept municipal solid waste. These sites must have containment added if geologic conditions are not ideal. Sites in all classes must be protected from floods and earthquakes and must have extensive monitoring to assure that leaks do not occur.

COLORADO

Various ground water problems are becoming of increasing interest in Colorado. During the past few years, serious ground water quality problems associated with poor past practices of toxic waste disposal have emerged on the outskirts of the Denver Metropolitan area. In addition, many problems involve disposal methods related to mining tailings which have been found to introduce high levels of heavy metals into certain aquifers. Further, a recent study of surface impoundments indicates that one out of three municipal, agricultural, industrial, mining, and oil and gas related impoundments have caused some ground water contamination. Ground water quantity problems are also an important concern, particularly overdraft of the Ogallala Aquifer located in eastern Colorado and adjoining states. These ground water management issues are expected to be of even greater concern in the future due to the pressures of growth on the resource.

In Colorado, ground water allocation is the responsibility of the State Engineer, Department of Natural Resources. Ground water quality is the responsibility of the Department of Health's Water Quality Control Division. Any ground water quality regulation and ground water quantity allocation conflicts are resolved on a case-by-case basis, but in no case can quality considerations supersede vested water rights. Ground water quality programs are financed mainly with state general funds, whereas quality programs are supported mostly with federal funds.

Ground Water Allocation

Ground water in Colorado is defined as either tributary, nontributary, or designated ground water. Tributary ground water includes seepage or percolating ground water which would eventually become part of a natural stream. Generally, all ground water is presumed to be tributary unless proven otherwise.

The 1965 Ground Water Management Act allowed for the appropriation of designated ground water and the creation of designated ground water basins, which by definition, include all ground water not tributary to any natural stream. Following notice and hearing procedures, the State Ground Water Commission may determine the boundaries of a designated ground water basin, as well as the estimated quantity of water stored in the aquifer, the estimated annual recharge rate, the estimated ground water use in the area, and the number of users.

Following designation of a basin, ground water can only be appropriated through a permit issued by the Commission which protects against waste and the impairment of existing water rights. The Commission may impose reasonable permit conditions, such as well spacing and limit extraction. Although the priority of claims is determined by the "first-in-time first-in-right" principle, the procedures differ from those for surface water rights (or rights to tributary ground water). Priorities are determined after hearings by the Ground Water Commission. The date of priority is effective either from the date of actual taking and beneficial use of ground water, or, following enactment of the 1965 law, from the filing of an application with the Commission. The Act also gives certain regulatory and administrative powers to the State Engineer and local management districts.

Tributary ground water is subject to the prior appropriation doctrine under the Colorado Constitution and the 1969 Water Right Determination and Administration Act which recognized the need to more fully develop and use the underground waters of the State. The 1969 Act addressed the potential interference with surface stream flows of an increasing number of wells. With some exceptions, it required the adjudication of water rights for wells before priority would be established as of the actual dates of initiation. It also provided certain protections to surface appropriators. Further, it declared as the policy of the State the integrated appropriation, use, and administration of ground water and surface waters in order to maximize the beneficial use of all waters of the State. Ground and surface waters are therefore conjunctively administered as one source.

An amendment to the law in 1971 authorized the State Engineer to promulgate separate rules and regulations covering wells in different stream basins and different aquifers with separate and distinct hydrologic features. Such rules and regulations have been promulgated for wells diverting water tributary to both the Arkansas and South Platte Rivers. With respect to the Arkansas, such action has been upheld by the Colorado Supreme Court.

Prior to construction, all ground water wells must be permitted by the State Engineer. Further, the Board of Examiners of Water Well Contractors licenses well drillers and has rules and regulations which provide minimum standards for the location, construction, modification, or abandonment of water wells and the installation, modification, or repair of pumping equipment.

Ground water mining is not strictly defined in Colorado, but the State Engineer may allow mining based on a reasonable use policy. In the Northern High Plains designated ground water basin, he permits a 40% decline over 25 years, and in non-tributary ground water basins permits are based on a 100-year aquifer life.

No specific administrative protection is provided prior ground water users in their means of diversion. To the extent the ground water is allowed to be appropriated, a user must deepen his well or take other suitable action to divert his water right. Legal action between prior and subsequent users over well interference questions must be initiated by civil suit through regular judicial channels.

The State of Colorado has completed an artificial recharge demonstration project in the South Platte area which was turned over to local users. Other projects are planned for the High Plains area. No specific permit is required for individual operators to practice artificial recharge, but usually a court decreed priority is sought by the recharger. The State does appropriate recharged water, generally under augmentation plans allowing rechargers to withdraw water by permit at a later date.

Ground Water Quality

In 1983, the Colorado Department of Health began an examination of the need for a comprehensive approach to ground water quality control, because of increased incidents of ground water contamination and a growing concern regarding protection of this valuable resource. A review of programs and legislative authorities at that time revealed that many different agencies at the local, state, and federal levels were implementing programs that provided ground water quality protection. This included the control of Class II wells under the UIC program being implemented by the Colorado Oil and Gas Conservation Commission. No comprehensive approach existed, however, for assuring consistency of those ongoing efforts and for providing control over all significant sources of ground water contamination.

Adequate authority for a comprehensive approach to ground water quality protection was found to exist in the Colorado Water Quality Control Act. Further, strong public support for such an approach was evident at a series of public meetings held by the Department across the State at that time. As a result, the Colorado Water Quality Control Commission, with the support of the Health Department's Water Quality Control Division, embarked upon a comprehensive approach for ground water quality protection to provide a more consistent focus for the conduct of the ongoing programs, together with additional control over activities/facilities not being regulated.

In May of 1984, the Water Quality Control Commission adopted a ground water quality protection goal to "provide maximum beneficial uses of ground water resources while assuring the safety of the users by preventing or controlling those activities which have potential to impair existing or future beneficial uses of ground water or to adversely affect the public health." Further, Governor Lamm issued an executive order in July of 1985 which stated that the Colorado Department of Health is given primary responsibility for coordinating the State's ground water quality protection efforts.

The Commission is pursuing a regulatory framework for accomplishing its goal. The framework would consist of basic regulations that include a classification and standards system for ground water quality protection, together with subsequent control regulations for controlling those activities/facilities currently unregulated by ongoing programs. A hearing on the basic standards proposal was held in August 1986. Deliberations and a decision on the proposal are expected in October 1986. That system, if adopted, would include a series of uses to be protected with domestic drinking water use given particular emphasis. Limited ground water quality degradation could take place within that framework, provided that the quality necessary to protect the prevailing and reasonably expected future uses would be protected.

Once adopted, the Water Quality Control Division intends to revise its ongoing discharge permit program for surface water discharges to include specific provisions for ground water quality limits for those activities that can be best regulated under that program. The Division also intends to continue its work with other local, state, and federal agencies to help bring about consistency of those regulatory processes with the basic standards regulation. Particular coordination is anticipated with the agencies responsible for septic systems management, mine-land reclamation, solid and hazardous waste disposal, oil and gas operations including UIC, radiological waste management, and the RCRA and Superfund programs. Furthermore, the Division will develop control regulations and specific activities or facilities currently uncontrolled and deemed to be particularly important to ground water quality management. Leading contenders for such regulations are certain leaking domestic lagoons, industrial process impoundments not covered by RCRA, emergency spills that contaminate ground water, agricultural chemigation practices, and materials stockpiles. One of these control regulations is likely to be promulgated in FY87 with two more in FY88.

IDAHO

Ground water pollution problems of the State of Idaho do not appear to be numerous, although there are site specific concerns. The State does have a number of areas where ground water overdraft is a problem. Eight areas have been declared critical (some as early as 1962) and four ground water management areas have been designated. Although permits for new appropriations are not being issued in these areas, water levels continue to fall.

The Department of Water Resources (DWR) has primacy for the federal UIC program and for ground water quantity management. The Department of Health & Welfare has responsibility for general ground water quality and for surface discharges. Both departments are required by statute to reconcile water management conflicts. To date, conflicts between ground water quality and quantity administration have not arisen.

The DWR is financed through state general funds and permit fees. Some federal funds are also used for ground water monitoring through a cooperative program with the USGS. Ground water quality programs are financed primarily with federal funds under CWA Section 106. Additional funding is available through Subtitle I of RCRA for the underground storage tank program.

Ground Water Allocation

Idaho has ground water appropriations statutes and established permit procedures which, along with judicial precedents, provide the mechanism for managing ground water use. In 1931, the Idaho Supreme Court rejected the concept of absolute ownership of ground water and in effect said that all subsurface water was percolating ground water subject to appropriation. In 1963, the Idaho legislature provided that the right to use ground water could only be acquired through statutory appropriation, except in the case of domestic wells or wells drilled solely for draining lands. Water well drillers are licensed by the State. Minimum wells construction standards have been adopted.

Idaho ground water law indirectly provides some protection for appropriators in their means of diversion. The rights of prior ground water appropriators are protected through the maintenance of reasonable ground water pumping levels, which are established by the DWR Director. However, to the extent that the ground water resource is allowed to be appropriated, a prior appropriator must deepen his well and/or alter his system as needed to divert his water right. However, domestic wells drilled prior to 1978 are afforded special status and protection. In cases of demonstrated direct and significant interference between individual wells, or wells and springs, state courts have awarded damages to prior appropriators or enjoined pumping by junior appropriators.

The State prohibits the mining of ground water. Although there is no precise statutory definition, the Idaho Supreme Court has equated mining to language prohibiting pumping in excess of the "reasonably anticipated average rate of future natural recharge."

With respect to conjunctive use, the law provides for the joint administration of surface and ground water. Permits for new ground water appropriations can be issued with provisions to protect surface water rights. Further, water districts are authorized to administer ground water rights if a direct interrelationship exists between the surface and ground water resources. Idaho statutes do not appear to require conjunctive use in order to optimize use of overall water resources.

Idaho law allows for the creation of ground water recharge districts. The only such district currently in existence is attempting to recharge a portion of the Snake Plain Aquifer with surface water diverted out of the Snake River. Benefits from the recharge program are assumed to accrue to all existing users of ground water within the district.

Ground Water Quality

Ground water quality protection in Idaho is primarily the responsibility of the Water Quality Bureau (WQB) of the Idaho Department of Health and Welfare. A Ground Water Quality Unit within the WQB was established in 1985. That unit is enhancing Idaho's ground water quality program as described below. The DWR administers statutes governing waste disposal and injection wells, well construction, and geothermal development.

Ground water quality standards are being drafted to regulate sources of contamination. The standards are, in August of 1986, available in draft form and are nearing public review. The standards contain numerical criteria for contaminants, an aquifer classification system, and narrative standards for some contaminant sources. In 1985 a major revision of the State's subsurface sewage disposal regulations was completed and a state-of-the-art technical guidance manual was developed. Site approvals are given by district health departments. Regulations are under development for the following potential sources of ground water contamination: (1) land application of waste water; (2) disposal of pesticide rinsate; (3) underground storage tanks; (4) feedlots and dairies; and, (5) cyanide leach mining. Special aquifer management programs are being developed at the state level for two key aquifers, the Rathdrum Prairie and the eastern Snake Plain aquifers. The scope of the management of the programs exceeds that of the federal sole source designation. A log of all incidents of ground water contamination is maintained to provide an assessment of ground water quality.

The State has adopted standards for waste disposal and injection wells, which in essence require any effluent discharged to the subsurface to comply with adopted standards for drinking water as the effluent enters the ground water. The issue of acceptable risk is inherently, but indirectly, considered by the statutes enacted by the legislature, and the regulations and standards adopted by the DWR. The standards for waste disposal and injection wells provide for the evaluation of economic and practical alternatives to subsurface disposal.

Currently, all identified aquifers are designated as drinking water sources or potential sources. However, aquifers could be designated in the future for waste disposal. The State can and has prohibited the disposal of waste through injection wells. The U.S. Department of Energy has questioned the State's authority to do so on federal reservations, but this legal question became moot upon delegation to Idaho of primacy for the federal UIC program.

Most underground injection wells in Idaho are used for the disposal of excess irrigation water and surface runoff waters. Some local incidents of contamination of drinking water wells have been experienced, and several irrigation waste water disposal wells have been abandoned or relocated to resolve these problems.

With respect to emergency powers, state and federal agencies have developed a comprehensive memorandum of understanding to insure that spills of hazardous materials receive an immediate response. The combined authority of the Department of Health and Welfare and DWR and the general police powers of the State, along with the authority of EPA, appear to be adequate to handle any emergencies.

The Idaho Hazardous Materials Bureau is empowered by the Idaho Hazardous Waste Management Act to manage hazardous waste treatment, storage, and disposal to protect ground water. In 1985, the Idaho Hazardous Waste Facility Siting Act was passed. A facility siting plan is under development. Ground water protection is a major criterion in the siting plan. The Department of Health and Welfare is actively pursuing primacy under RCRA.

MONTANA

Numerous, relatively minor incidents of pollution of shallow ground water aquifers have been documented in Montana. Few, if any, major ground water drinking supplies have been affected. Major difficulties have been avoided, in part, because of sparse population of the State. However, some incidents of pollution have been identified in which the use of ground water has been impaired. Most incidents have been related to spills or leaks of petroleum fuels. These incidents have been taken seriously as representing the fragility of the resource, demonstrating the potential threat to drinking water sources, and illustrating the need to protect ground water.

Ground water quality management in Montana is primarily the responsibility of the Water Quality Bureau of the Department of Health and Environmental Sciences (DHES). Financing for the Bureau's ground water programs comes from state general funds and EPA CWA Section 106 grants.

Ground water quantity management is primarily the responsibility of the Water Rights Bureau of the Department of Natural Resources and Conservation (DNRC), and such programs are supported with mostly state general funds and some "earmarked" revenue.

Ground water allocation and ground water quality conflicts are resolved through informal and formal contact between DHES and DNRC. Water appropriation permit applications are sent by DNRC to DHES. DHES may submit objections to the application before a permit is issued. Although the permit criteria do not specifically mention water quality, such affects are considered.

Ground Water Allocation

Water use in Montana is generally guided by the principles of prior appropriation and beneficial use. The State has had an administrative statute governing the appropriation and regulation of ground water since January 1, 1962.

Until 1962 for ground water, and 1973 for surface water, Montana law recognized water rights obtained in three ways. First, appropriated rights could be obtained by filing a public notice of intended use with the county clerk, diverting the water and putting it to beneficial use. Second, use rights could be established simply by putting the water to beneficial use, even though the rights may not have been legally recorded. Use rights are valid if the water user can prove the date when the beneficial use began and the amount of water used. Third, decreed rights, which originate as appropriated rights or use rights, could be established by courts.

The Montana Water Use Act of July 1, 1973, established a centralized record system, as well as a "permit system," for the creation of any new or additional water rights. It generally superseded the Ground Water Code of 1961, though some parts of the 1961 code were retained. All water rights existing prior to the passage of the Act were "confirmed" by the Montana Constitution. These rights, many of them unrecorded, have or are being determined through an adjudication process in state courts. In 1979, the legislature passed Senate Bill 76, which created state water courts to preside over four water divisions for the purpose of identification and quantification of "confirmed" rights.

On June 6, 1979, the Montana Supreme Court issued an order requiring every person claiming ownership of an existing water right to file a statement of claim for that right with DNRC no later than April 30, 1983. Claims for livestock and individual domestic uses from surface or ground water sources were exempted from this process, although such claims could be made voluntarily. Following preparation of a preliminary decree, as well as an opportunity for hearings and objections, the court issues a final decree, and on that basis DNRC will issue a "certificate of water right" to each person decreed an existing right.

New or additional development of surface water and ground water made after July 1, 1973, must receive from DNRC either a "certificate of water right" or a "permit to appropriate water." Permits to appropriate water issued by DNRC are conditional, in that they are added by priority date after the adjudication and final decree of all existing water rights. When a permitted project is completed, DNRC verifies it and, if it is completed in substantial accordance with the permit, a "certificate of water right" is granted. If an anticipated use is 100 gallons per minute or more, a "permit to appropriate water" must be applied for and received before development begins. Applications to appropriate more than 3,000 acre feet of ground water per year must be approved by the legislature, but this requirement does not apply to appropriations for municipal use, public water supplies, or the irrigation of cropland owned and operated by the applicant.

With respect to protection of means of diversion, the basic purpose of Montana's water use permit system is to protect prior water rights. Existing users are notified of permit applications near them and may object to the new water use. If the objections are valid and an agreement cannot be reached among all parties involved, the case is brought before a hearing officer for administrative determination. A proposed order is issued, and, following comment and review, a final order is issued and signed by the Administrator of DNRC's Water Resources Division. Any aggrieved party may file an appeal with the district court.

If after a permit is issued prior water right users are adversely affected, DNRC investigates the matter and may modify or revoke permits with cause. Prior water right users may also file civil court actions. The district court generally has jurisdiction in cases involving compensation or injunctive measures. The Department has not yet administratively required compensation for any additional costs which may have been incurred by prior users. However, on occasion, water levels, pumping depth, or other restricted conditions have been placed on permits administratively.

Montana's permit system applies to both surface and ground water uses. Ground water is often used in conjunction with surface water, either as a primary, secondary, or supplemental source. There are no specific statutes or programs in Montana related to artificial recharge or ground water aquifer storage.

A permit is not necessary to develop wells or springs with an anticipated use of less than 100 gallons per minute. In such cases, a "well log report" is completed by the driller and sent to DNRC with a copy to the well owner. When work is completed the owner submits a "notice of completion of ground water development," along with a filing fee. The priority date of the water right is the date DNRC receives the completed form.

The 1961 Ground Water Code provided for the establishment of controlled ground water areas. This section was strengthened in 1979. Surface boundaries are set to indicate the location and extent of the underground aquifer, and ground water withdrawals within these boundaries are regulated. A petition for designation of a controlled ground water area can be submitted to the Board of Natural Resources and Conservation by ground water users in an area (at least 20, or one-fourth of the users in an area, whichever is less, must sign the petition) or an area can be proposed by DNRC. The petition or proposal must show that (1) ground water overdraft is occurring; or (2) excessive withdrawals are likely to occur soon; or (3) there are significant disputes over the priority dates of water rights, amounts of ground water in use, or priority of type of water use in the area; or (4) ground water or water pressure levels in the area have or are declining; or (5) excessive ground water withdrawals would result in contaminant migration and degradation of ground water quality.

In such designated areas a permit is required in all cases to appropriate ground water in any amount. Areas are designated by the Board of Natural Resources and Conservation following public hearings on a petition. Depending on the situation, the Board's order may include any of the following provisions: (1) closure of the area to future ground water development; (2) limiting withdrawals over a given time period and dividing the amount among users by the priority date of water rights; (3) establishing a preference for livestock and domestic use regardless of priority dates and assigning preferences among remaining uses; (4) establishing water duties for users in the area; (5) limiting the use of more than one well by the same user; (6) requiring a system of rotation of ground water use; and, (7) other requirements.

Under the above procedures, two ground water control areas have been created, one permanent and one temporary. Petitions are pending for the creation of four "rule adoption" areas and a second permanent control area. The South Pine Control Area, a permanent area, was created November 1, 1967. It is located north of Baker, Montana, and contains portions of seven townships in Prairie, Wilbaux, and Fallon Counties. The Larson Creek Control Area, a temporary area, was created in November of 1984 and is located in Ravalli County. These areas have proved to be effective management tools.

The above provisions allow the State to prohibit the mining of ground water, though mining is not specifically defined by statute.

The Montana Department of Natural Resources and Conservation, through the Board of Water Well Contractors, licenses all Montana water well drillers. The State has specific statutes, rules, and regulations which provide some construction standards. Detailed minimum water well construction standards are required through legislative mandate and rules of the Board of Water Well Contractors are in the process of being drafted and adopted before January 1, 1987.

Ground Water Quality

Montana's Water Quality Act prohibits pollution of state waters, which are defined to include underground waters. The Water Quality Act requires the State Board of Health and Environmental Sciences to adopt rules governing permits to discharge waste into state waters, and to establish classifications and water quality standards for all state waters.

The Water Quality Bureau prepared draft ground water permit regulations and quality standards which were adopted by the State Board of Health. The ground water quality standards included in the regulations enhance the enforceability of the Montana Water Quality Act as it applies to ground water. The regulations and standards are geared to control ground water degradation, and require permitting of "point-type sources," treatment works, and disposal systems or ponds which might potentially discharge pollutants to ground water. If the source requires a permit under other regulations which address ground water protection, a duplicate permit is not required and only the ground water standards will apply. The regulations and standards are based on protecting beneficial uses rather than prohibiting all constituent-by-constituent changes.

Ground waters of the State are classified into four categories based on existing quality and suitability for various future uses. General and numeric standards have been proposed, and point sources will not be allowed to violate these standards in ground water. Where existing ground water quality is better than the standards, degradation will not be allowed if it will adversely affect the existing or reasonably expected beneficial uses of the water. Non-point sources are not allowed to change the quality of usable ground water unless all reasonable best management or conservation practices have been applied.

Class I ground waters are defined as requiring little or no treatment to be suitable for public and private water supplies, culinary and food processing purposes, irrigation, livestock and wildlife watering, and for commercial and industrial purposes. Concentrations of various dissolved substances may not exceed Montana's maximum containment levels (MCL's) as set forth in drinking water regulations. Concentrations of other toxic, hazardous, or deleterious substances are not to exceed levels set forth in separate guidelines which would render the ground water unsuitable, or for practical purposes untreatable, for its designated beneficial uses.

Further, Class I ground waters have a specific conductance of less than 1,000 micromhos per centimeter at 25 degrees centigrade (in lieu of milligrams per liter total dissolved solids measures).

Class II ground waters are defined as marginally suitable for public and private water supplies, culinary and food processing uses, and are suitable for irrigation of some agricultural crops, for drinking water for most livestock and wildlife, and for commercial and industrial purposes. Class II ground waters may be used for domestic and municipal water supplies in an area where better quality water is not readily available, and such drinking water supplies must meet applicable MCL's for various substances. Again, concentrations of other substances may not exceed levels (as established by guidelines) which would render the ground water unsuitable for its designated beneficial uses. Class II ground waters have specific conductance ranging from 1,000 to 2,500 micromhos.

Class III ground waters are suitable for some industrial and commercial uses, such as drinking water for some wildlife and livestock, and for irrigation of some salt tolerant crops using special water management practices. In some cases, Class III ground waters are the only economically feasible source for municipal or domestic water supplies and appropriate MCL's apply. Guidelines for other substances are applicable as described above. Class III ground waters have specific conductance ranging from 2,500 to 15,000 micromhos.

Class IV ground waters may be suitable for some industrial, commercial and other uses, but are unsuitable or for practical purposes untreatable for higher class beneficial uses. These ground waters have specific conductance greater than 15,000 micromhos. Where they have a beneficial use, they are protected to the extent necessary to continue that use.

The regulations state that the ground water quality standards shall be applied at the outer limits of a mixing zone, to utilize the benefits of dilution and pollutant attenuation. The boundaries of the mixing zone will be set on a case-by-case basis and will generally extend to the point where some other beneficial use of the ground water occurs, or is reasonably expected to occur, in keeping with the idea of protecting beneficial use rather than simply prohibiting any constituent change in the immediate area where a seepage encounters ground water.

Permitting under the regulations is set up so that administrative procedures parallel those of the Montana Pollutant Discharge Elimination System (MPDES), the State's surface discharge permit program. Permit conditions are flexible, but virtually all sources with significant pollution potential are required at a minimum, to monitor ground water quality at the mixing zone boundaries. Early warning monitoring wells may also be required, as well as contingency action plans.

The issue of acceptable risk is indirectly addressed through the idea of beneficial use. Appropriate regulations heve been justified economically.

In the Department's opinion, Montana's regulations and standards represent a manageable program to prevent unchecked degradation of the State's ground water without the devastating economic impacts that would occur from prohibiting all development of the resource. Further, the concepts of protecting reasonable beneficial uses and utilization of reasonable conservation practices allow the imposition of economically feasible technologies as permit conditions.

With respect to emergency authority and capability, various state statutes form the basis for the Montana Disaster and Emergency Plan which was established in 1978. The plan covers the effects of natural or man-caused disasters, including those related to ground water resources.

At this time, Montana does not intend to seek primacy under the federal UIC program. The State has authority as previously described to prohibit underground injection waste disposal practices without a permit, with the exception of oil related injection wells. Currently, there are no subsurface disposal wells which are not oil related. Domestic well problems associated with these disposal practices have sometimes been alleged to exist, but seldom, if ever, proven. A program to control leaking underground storage tanks will begin in 1986. The program is being formed within the Solid and Hazardous Waste Bureau of the DHES.

The State has siting standards for the land disposal of hazardous waste. The Solid Waste Bureau has adopted the federal RCRA program. The State has also developed a hazardous materials response plan to meet emergencies.

NEVADA

Currently, the State of Nevada does not have significant ground water problems. This can best be attributed to the existence of an effective ground water law enacted in 1939. With respect to ground water allocation, a full commitment to management of the resource has led the State Engineer's office to designate several hydrographic areas within the State as critical ground water areas.

The Department of Conservation and Natural Resources (DCNR) is the entity responsible for the protection and utilization of Nevada's natural resources. Within DCNR, ground water quality is the responsibility of the Division of Environmental Protection (DEP) while ground water quantity is managed by the Division of Water Resources (DWR) under the direction of the State Engineer. The Director of DCNR oversees the administration of both divisions. Programs of both divisions are financed with state general funds, with some federal financial participation.

Ground Water Allocation

The Nevada legislature has declared all water within the State to belong to the public. Vested ground water rights are defined as those acquired and continuously used prior to March 22, 1913, for artesian or definable aquifers, and those prior to March 25, 1939, for percolating waters. Presently, the right to use ground water can only be acquired by permit through statutory appropriation procedures. Domestic wells are excepted.

Nevada law provides that upon petition of at least 40% of the well owners in a basin, or upon the initiative of the State Engineer, a designated basin, or portion thereof, can be established and the State Engineer may exercise additional administrative authority over all wells. Provision is made for the appointment of county ground water boards. When created, such boards assist the State Engineer in administration of the resource within the designated ground water basins. In all such basins, or portions thereof, no development can be initiated without obtaining a permit through the State Engineer. In non-designated basins, wells may be drilled before a permit is applied for, but only at the applicant's risk. However, in either case the State Engineer must determine: (1) that unappropriated water is available, (2) what the probable effect will be on existing rights, and (3) that approval would be in the public interest and welfare.

All well drillers must obtain a license through the State Engineer before drilling. They are required to keep well logs of their wells and comply with all rules and regulations adopted by the Engineer, which include well construction standards.

With regard to protecting the appropriator's means of diversion, Nevada law recognizes an appropriator's right only to a specific quantity of water, which may be subject to a reasonable lowering of the water table.

The State Engineer determines what is reasonable, taking into consideration, among other things, the economics of pumping and the type of crops grown in the area. He may also consider the effect of water use on the economy of the area in general.

Ground water mining is not defined by statute, but the State Engineer has the authority to restrict use in order of priority of right where he finds the average annual recharge is not adequate to satisfy all rights. He may also restrict drilling where he determines additional wells would cause undue interference with existing wells. Further, in any designated area which is being depleted, the Engineer is empowered to take such actions deemed essential to protect the public welfare. In acting on applications to appropriate ground water in such areas, he may designate certain preferred uses, issue temporary permits, and, where possible, require an applicant to obtain water from a public entity. The law also provides for the adjudication of ground water rights, which are expressly made subject to statutory forfeiture and loss by abandonment.

The appropriation doctrine applies to the use of ground water and surface waters conjunctively, with limited discretionary authority provided to the State Engineer under the law. Waste from artesian wells is a misdemeanor. Nevada has no artificial recharge program for aquifer storage. However, the State has recognized the concept of artificial recharge of a ground water aquifer by granting permits which allow the injection of adjudicated surface water into a ground water aquifer for storage. The water is allowed to be recovered from storage by pumping to support residential development.

Ground Water Quality

The DEP is responsible for implementation and enforcement of the Nevada Water Pollution Control Law, while the State Environmental Commission (within the Department) has exclusive power to promulgate rules and regulations necessary to implement the law. Such regulations provide authority to control the disposal of pollutants into wells to protect the public health and welfare, as well as prevent pollution of underground and surface water resources. The Commission is specifically charged with evaluating the economic impact of such regulations.

The Department of Minerals (DM) was created in 1983. It replaced the Division of Mineral Resources. DM is responsible for administering Nevada oil and gas conservation law, protecting surface and subsurface fresh water from pollution related to oil and gas development, in addition to regulating the geothermal development in the State. No person can drill or operate a geothermal well without first obtaining a permit from DM. Also, a permit must be obtained for any consumptive use of water brought to the surface outside of a geothermal well.

Unless specifically authorized, the Nevada Water Pollution Control Law makes it illegal for anyone to discharge waste into any waters of the State without first obtaining a permit. High quality waters are to be protected to the greatest degree available given present technology.

To obtain a permit, discharger must submit an application to DEP, which reviews the application and prepares a draft permit. Following public review and comment, a final permit is issued or denied. Permits may be issued for a term not to exceed 5 years. Application fees are charged and credited to a water pollution control permit fund, which is used to administer the program.

All permits are renewable if limitations are followed which restrict the quantity, rate, and concentration of pollutants discharged. Such limitations are based on the effect on the receiving waters and its current beneficial use. Any permit may be revoked if its terms are violated or if it is obtained under false pretenses. Further, legislative changes may lead to the revocation or modification of a permit. Changes in discharges must be reported by submitting a new permit application.

Nevada law specifically prohibits the discharge of any nuclear, biological, or chemical warfare agent or any high-level radioactive waste. Also prohibited are any proposed disposal which contradicts CWA Section 208 area-wide waste treatment management plans, or rules and regulations of the Commission.

Any person aggrieved by the actions of the DEP Director on a permit decision may appeal to the Commission, which holds a public hearing prior to making the final determination. Most of the costs incurred by such an appeal are charged to the requesting party.

Under a memorandum of understanding with various State departments, the State Civil Defense has the authority and capability for emergency response.

A ground water classification system has not been adopted, nor have ground water standards been developed. Rather, all ground water is protected from contamination as described above.

The federal UIC program is currently administered in Nevada by EPA. The State expects to achieve primacy in the near future. The State Engineer can prohibit the disposal of wastes through injection wells based upon possible contamination of fresh water aquifers. The primary types of such wells are oil and gas related, and geothermal. There are a limited number of cooling water injection wells, but these are located in areas not affecting drinking water supplies.

The State has not adopted any land use controls to protect ground water. However, with respect to the land disposal of hazardous wastes, standards are being developed which will be equivalent to those of RCRA.

NEW MEXICO

Ground water quality and quantity problems in New Mexico are significant, but they are in large part adequately addressed by the State.

The New Mexico Water Quality Control Commission is primarily responsible for promulgation of regulations and standards regarding water quality, while specific quality programs are administered by the Health & Environment Department's Environmental Improvement Division and by the Energy and Minerals Department's Oil Conservation Division and Mining and Minerals Division.

The State Engineer Office is responsible for water quantity management. However, under authority independent of that delegated to the Water Quality Control Commission, the State Engineer may limit changes in water well location (from areas of poor water quality), as well as the amount appropriated, as necessary to prevent or retard encroachment of poor quality water on sources of good quality water.

All of the above state agencies are financed by appropriations from state general funds, except for the Oil Conservation Division and the Mining and Minerals Division which operate from a conservation tax which is imposed upon oil, gas and mineral production. In addition, these two divisions, as well as the Environmental Improvement Division, receive some federal grant monies.

With respect to potential management conflicts, the State Engineer is an ex officio member of the Water Quality Control Commission; thus water quality and quantity management are effectively coordinated.

Ground Water Allocation

In New Mexico, legislation was enacted in 1927 to control ground water use. It was amended in 1931, and it has subsequently formed the basis for New Mexico's current ground water law. In 1953 the law was amended to declare that all underground waters of the State belong to the public and are subject to appropriation for beneficial use. However, no permit or license is required to appropriate water, except where the State Engineer has designated basins which have reasonably ascertainable boundaries. At the present time 31 basins have been so designated, encompassing approximately 84,000 square miles or 69% of the State's area.

Anyone intending to appropriate ground water in a designated or declared basin must apply for a permit from the State Engineer. Before approving the proposed application, the State Engineer must find that there is unappropriated water in the basin, and that the proposed appropriation would not impair existing rights, would not be contrary to the conservation of water and would not be detrimental to the public welfare. The burden is on the applicant and provisions are made for hearing protests.

A landowner lawfully initiating a ground water right and completing development with reasonable diligence acquires a water right with a priority dating from initiation of the work, even though his land may be incorporated into a declared basin prior to completion. The State Engineer has regulatory authority in such areas, but domestic, stock watering and certain other minimal uses are exempted from general administration requirements under the law.

New Mexico regulates water well drilling, and has construction standards for wells which encounter artesian aquifers. In designated basins, a well driller's license must be obtained from the State Engineer to drill for water.

The State Engineer is also empowered to approve permit applications subject to appropriate conditions. This procedure provides some protection for prior ground water users in their means of diversion. However, the New Mexico Supreme Court has ruled that the lowering of a water table in any particular amount does not necessarily constitute an impairment of the water rights of adjoining appropriators. Further, in 1980, a right of replacement was created under the Mine Dewatering Act, which allows anyone whose appropriation or mine dewatering activities would otherwise impair existing water rights to provide such prior users with a substitute water supply of adequate quality and sufficient quantity to prevent impairment. The State Engineer must approve the plan of replacement.

Among the State Engineer's other regulatory responsibilities are approval of any change in the location of any wells or change in the use of the water. In addition, ground water use rights may also be forfeited for failure to apply the water to beneficial use for a four-year period, if not applied to beneficial use within one year after notice. However, the State Engineer may grant consecutive extensions on a showing of reasonable cause for non-use. Further, subject to certain conditions, including the existence of an emergency situation, a water right owner may drill a replacement or supplemental well prior to acquiring a permit to do so.

Administratively, ground water mining is simply considered to be withdrawal from an aquifer in excess of recharge, and the State Engineer can and does prohibit mining in some situations. Further, the New Mexico Supreme Court has upheld the authority of the State Engineer to approve an application to appropriate water from an unrechargeable ground water basin in a case where the State Engineer determined the amount of water which could be withdrawn from the basin annually over a 40-year period and still leave one-third remaining in storage. In effect, this puts a termination date on the right. With regard to the adjudication of ground water rights, the application of surface water adjudication procedures to ground water basins has been upheld in court.

The State does not have an artificial recharge program, but conjunctive use is addressed. In stream systems where surface and ground waters are interrelated, new appropriations may be approved on the condition that any effects on the stream are offset by the retirement of existing surface water rights.

Ground Water Quality

The New Mexico Water Quality Act created the Water Quality Control Commission, which consists of representatives from the Environmental Improvement Division, the Game & Fish Department, the State Engineer, the Oil Conservation Division, the State Park & Recreation Division, the Department of Agriculture, the Soil and Water Conservation Division, the Bureau of Mines and Mineral Resources, and one public representative. The Commission is administratively attached to the Health and Environment Department.

The Commission is the State water pollution control entity responsible for all purposes under the federal CWA. It is responsible for the development of a comprehensive water quality program and a continuing planning process, as well as water quality standards and the promulgation of regulations to prevent or abate water pollution in the State. In promulgating regulations the Commission is required to consider the risk to public health and welfare, economic reasonableness, technical practicality, property rights and accustomed uses. Responsibility for administering the Commission's regulations are assigned to constituent agencies, and to this end the Commission may make such classification of waters and sources of water contaminants as is necessary. Variances from the regulations due to hardship are allowed under established procedures.

Current regulations require that a notice of intent to discharge to surface and/or ground waters be filed with the Ground Water/Hazardous Waste Bureau or the Surface Water Quality Bureau of the Environmental Improvement Division, or in the case of facilities related to (1) the production, transportation or refining of crude oil or natural gas, or (2) geothermal operations, with the Oil Conservation Division. Except for discharges in compliance with federal National Pollution Discharge Elimination System (NPDES) permits, state regulations prohibit the discharge to watercourses of effluent which does not conform to established standards. Discharges onto or below the surface of the ground are controlled to protect all ground water with 10,000 mg/l or less total dissolved solids (TDS) for present and potential future use.

Any discharge which may threaten human health, animal or plant life, or property, or unreasonably interfere with the public welfare must immediately be reported to the Bureau. This includes spills, leaks, or dumping of regulated substances which have a reasonable possibility of reaching surface or subsurface water.

In general, the regulations allow degradation up to numerical standards set for human health, domestic, and agricultural water supply. In adopting numerical standards, acceptable risk is addressed by developing a reasonable safety factor based on medical testimony. Where these standards are already exceeded due to natural causes or historical contamination, no further degradation is allowed.

The regulations state that no person shall cause or allow effluent or leachate to discharge so that it may move directly or indirectly into ground water without an approved discharge plan. Subsequent discharges must be consistent with the terms and conditions of the plan. Exemptions from this requirement include discharge of (1) effluent or leachate conforming to the listed numerical standards and which does not contain any toxic pollutant; (2) small sewerage systems (less than 2,000 gallons per day) which are controlled by another Bureau of the Environmental Improvement Division; (3) irrigation water generally (except land application of sewerage, etc.); and, (4) constituents subject to the NPDES permit program, flood control systems, natural leachate, leachate regulated under solid waste management regulations, or effluent or leachate regulated by the New Mexico Coal Surface Mining Commission or the Oil Conservation Division.

A proposed ground water discharge plan must set forth in detail the methods or techniques the discharger proposes to use, or processes expected to naturally occur, which will insure compliance with the regulations. Discharge plans must also provide for monitoring (including monitoring in the vadose zone and monitoring after cessation of operations if required). Sampling and analytic techniques are specified. There are also various reporting requirements. In addition, the plan must include contingency criteria, as well as measures to prevent ground water contamination after the cessation of operations. There are also various other requirements.

Public notification and participation procedures must be addressed before a determination is made on a proposed discharge plan. The Environmental Improvement Division Director has authority to approve, disapprove, modify or terminate discharge plans. Permits are approved for a period of no longer than 5 years, except that for new discharges, the term of the permit shall commence on the date the discharge begins, but in no event shall the term of the permit exceed seven years from the date the permit was issued. Decisions of the Director may be appealed to the Commission. Specifically, if a discharge plan is disapproved because it would not meet established numerical standards, the discharger may seek the Commission's consideration if he believes that the plan demonstrates the maximum use of technology within his economic capability, or that there is no reasonable relationship between the economic and social costs and benefits to be obtained, and that discharge under the plan would not create a hazard to public health or undue risk to property. Commission decisions may be appealed to the courts.

A ground water classification procedure has been established using total dissolved solids (TDS) as a measure of quality. The State has authority to prohibit disposal of waste where the affected ground water contains less than 10,000 mg/l TDS. However, different categories have been created for ground water quality ranging from 5,000 to 10,000 mg/l and after public hearings, the Water Quality Control Commission may designate some aquifers with TDS exceeding 5000 mg/l for waste disposal by injection.

Underground injection in the State mainly involves oil and gas wells and in situ leaching of uranium and salt extraction processes. The Oil Conservation Division regulates the disposition of water produced or used in connection with oil and gas production and geothermal resources, under the Oil and Gas Act and the Geothermal Resources Conservation Act, respectively. The Division must also afford reasonable protection against contamination of fresh water supplies designated by the State Engineer.

The Oil Conservation Division in 1982 received primacy from EPA under the SDWA's UIC program for Class II wells. The Environmental Improvement Division was granted primacy for other classes of wells in 1983.

With respect to land use control, the State's Subdivision Act requires developers to ensure that an adequate supply of water of appropriate quality is available for any new tracts. Further, the developer is required to adequately provide for the disposal of sewage.

In addition to ground water protection under the Water Quality Act, the Environmental Improvement Division has regulated hazardous waste generation, transportation, disposal, storage and spills since 1978, and also administers the federal RCRA program.

NORTH DAKOTA

Ground water is a valuable resource in North Dakota. Over half of the State's population relies on it for domestic use. The State's ground water quality problems have been minor. This is due in part to the late development of industry in the State. Also, prior to significant industrial development, a comprehensive inventory of ground water resources was performed. The data provided through that inventory, along with continued monitoring, have allowed early identification of potential problems and the prompt implementation of appropriate corrective measures.

Ground Water Allocation

North Dakota allocates surface and ground water according to the doctrine of prior appropriation. Preference in granting permits for various uses is as follows: domestic, municipal, livestock, irrigation, industrial, and fish, wildlife, and other outdoor recreation uses. The State Engineer allocates ground water based on sustained yield which is defined as an average withdrawal that can be maintained without continuing depletion.

The development of North Dakota's water resources has not yet reached a level where the conjunctive management of ground and surface water is seen as essential. Nevertheless, the State has defined areas where a strong relationship between ground and surface water exists and is undertaking detailed investigations in these areas to better define the relationship. The State's goal is, ultimately, to predictively model the interaction between the two systems and conjunctively manage them.

North Dakota law requires each ground water user to make a reasonable effort to capture his allocated water under changed conditions, such as general decline in the level of an aquifer. Wells must be reasonably efficient, therefore, in terms of theoretical water level drawdown. Also, they must fully penetrate the aquifer, with the pump set as deeply as possible. Where prior appropriators are making a reasonable effort to capture the allocated water and they are unable to do so under changed conditions, junior appropriators are required to cease or reduce pumping to the extent necessary for senior appropriators to once again capture their allocated supply. In this sense, North Dakota offers protection to prior ground water appropriators in their means of diversion as against subsequent users.

North Dakota has a licensing program for water well contractors. It establishes certain minimum criteria and design requirements for well construction and contains approved procedures for licensed well contractors. The State publishes a booklet containing this information.

North Dakota does not have an artificial ground water recharge program promoted by the State. However, efforts to promote such recharge have, at times, been undertaken. For example, in the 1960's the City of Minot utilized a recharge facility to augment its water supply during periods of shortage. The facility was later abandoned in favor of another source of supply.

The North Dakota State Water Commission, specifically the State Engineer, and the State Department of Health, coordinate programs which address potential conflicts between ground water allocation and ground water contamination problems. The State has encountered very few such conflicts. Through cooperative investigation the resources of the Water Commission and Department of Health are used to determine causes of contamination and identify measures for cleanup and prevention. The State recognizes the potential for conflict between ground water quantity and quality management and addresses any difficulties on a case-by-case basis.

Ground Water Quality

Chapter 61-28 of the North Dakota Century Code establishes the State Department of Health (SDH) as the State agency primarily responsible for the prevention of ground and surface water pollution. It directs SDH to develop a comprehensive program for the prevention, control, and reduction of pollution of waters. Programs within the Department related to ground water protection include: point and non-point source pollution control, public water supply, underground injection control, construction grants, and solid and hazardous waste management. In addition, since ground water can be contaminated by a variety of sources, the North Dakota ground water protection program includes other state agencies with their own enabling legislation and rules to protect ground water. A table is attached to this section which summarizes ground water quality protection statutes, rules, and programs in North Dakota.

The ground water classification system in North Dakota is the system incorporated in the federal UIC program. North Dakota received primacy for the UIC program in 1984. Three state agencies are involved. UIC Class I and Class V wells are regulated by SDH, Class II wells by the Industrial Commission of the Oil and Gas Division, and Class III wells by the State Geological Survey. Most wells in North Dakota are Class II as demonstrated by the following table:

	Estimated Number of Injection Wells		Estimated Volume of Fluid Injected (million gallons per year)	
	1985	1980	1985	1980
Class I	3	1	151	4
Class II	571	442	3,719	1,841
Class III	4	3	146	120
Class V	140	10	152	8

Underground injection activity has increased substantially in North Dakota since 1980. Nevertheless, there have been few documented cases of ground water contamination associated with injection wells. No cases have been reported within the past three years.

Under the UIC program, the State can prohibit the disposal of certain wastes and/or control zones into which the wastes are disposed. The program uses the same general policies as other ground water protection programs in North Dakota and does not allow waste disposal into any aquifer with a total dissolved solids (TDS) concentration of less than 10,000 mg/l unless the aquifer is exempted under certain UIC criteria.

North Dakota's ground water protection controls are source oriented, with contamination sources controlled by the permitting process. Critical recharge areas and vulnerable aquifers are considered when permitting and siting facilities or activities which may contaminate ground water.

State water quality standards address both ground and surface water. These standards, and the State's drinking water standards, are used as the basis for the State's ground water protection programs. The state has a non-degradation ground water policy protecting aquifers containing less than 10,000 mg/l TDS. Aquifers containing greater than 10,000 mg/l TDS have more limited protection. The State recognizes that absolute non-degradation may not be feasible if the ground water resource is to be developed. However, the State adopted the non-degradation policy to make clear that it does not endorse ground water contamination.

North Dakota drinking water standards are similar to federal standards. Thus, the State has little experience is weighing health risks against economic factors in developing standards. However, economic factors are considered in SDH's policies for aquifer protection and restoration. The hazardous waste management program has established permitting and siting standards for land disposal of hazardous wastes in order to protect ground water quality (see the attached table, Sections 2 and 4).

North Dakota has the capability and authority to respond to any ground water related emergency which threatens human safety. Section 8 of the attached table summarizes the State's response authority for accidental spills.

SDH realizes that its existing ground water protection programs may not be totally adequate to protect the State's ground water resources from all future contamination. To strengthen its commitment to ground water protection, SDH has recently increased its staff and initiated the development of a more formal and comprehensive ground water protection strategy.

SDH's programs are funded largely through EPA program grants. These grants range in percentage of federal funding from 75%-100%. The state match comes from general state revenues and special funds. The State's water allocation programs are financed with state revenues.

TABLE I

SOURCES OF GROUNDWATER CONTAMINATION	STATUTES GOVERNING SOURCES OF CONTAMINATION (NORTH DAKOTA CENTURY CODE)	RULES ESTABLISHED UNDER STATUTE (NORTH DAKOTA ADMINISTRATIVE CODE)	GOVERNING AGENCY*	BRIEF DESCRIPTION OF REGULATORY AUTHORITY AND GUIDELINES
1. Waste impoundments				
a. Industrial b. Municipal	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Water	Chapter 33-16-01 North Dakota Pollutant Discharge Elimination System	WSPC	The statute requires plans and specifications for all industrial and municipal impoundments be submitted to the Department for approval. The rules establish permit requirements on discharges from these facilities.
c. Livestock		Chapter 33-16-03 Control of Pollution from Livestock Enterprises	WSPC	The rules require livestock operations of 200 animal units or more be permitted to operate by the Department. All animal waste management systems funded by the Federal Department of Agriculture are submitted to the Department for approval.
d. Hazardous waste	Chapter 23-20.3 Hazardous Waste Management	Article 33-24 Hazardous Waste Management	DWM-SS	Section 33-24-05-(115-121) Surface Impoundments Requirements set standards for design, operation, monitoring, and inspection of hazardous waste impoundments.
2. Contamination from surface water	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Water	Chapter 33-16-03 Water Quality Standards	WSPC	Water quality standards apply both to surface and groundwater.
3. Injection wells				The rules for all underground injection control programs require permits for all injection wells and establish construction, operating, monitoring, and reporting requirements to protect groundwater.
a. Oil and gas	Chapter 38-08 Control of Gas and Oil Resources	Chapter 43-02-05 Underground Injection Control	OGD	
b. Mining	Chapter 38-12 Regulation Development	Chapter 43-02-01.1 Underground Injection Control	NDGS	
c. Municipal d. Industrial e. Geothermal	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Water	Chapter 33-25-01 Underground Injection Control	WSPC	
4. Solid waste disposal				
a. Municipal landfills b. Special use landfills 1. Fly ash 2. Drilling fluid 3. Lime sludge 4. Construction waste	Chapter 23-29 Solid Waste Management and Protection Act	Article 33-20 Solid Waste Management and Land Protection	DWM-SS	The rules prescribe minimum standards for the storage, collection, transportation, and disposal of solid wastes. All sites are geologically sited for groundwater protection. Groundwater monitoring may be required.
c. Hazardous waste disposal sites	Chapter 23-20.3 Hazardous Waste Management	Article 33-24 Hazardous Waste Management	DWM-SS	Chapter 33-24-05 sets standards for the treatment, storage, and disposal of hazardous waste. Section 33-25-05-(47-50) Groundwater Protection Requirements set minimum standards for groundwater protection including monitoring and corrective action programs.

TABLE I (Continued)

SOURCES OF GROUNDWATER CONTAMINATION	STATUTES GOVERNING SOURCES OF CONTAMINATION (NORTH DAKOTA CENTURY CODE)	RULES ESTABLISHED UNDER STATUTE (NORTH DAKOTA ADMINISTRATIVE CODE)	GOVERNING AGENCY*	BRIEF DESCRIPTION OF REGULATORY AUTHORITY AND GUIDELINES
5. Well Construction				
a. Improper well construction b. Abandon wells	Chapter 43-35 Water Well Contractors	Chapter 33-18-01 Water Well Construction and Water Well Pump Installation	WSPC	The statute requires all firms engaged in water well construction to be certified and establishes a state board of water well contractors. The rules establish location and construction requirements for water wells, irrigation wells, monitoring wells, abandoned wells, and geothermal return wells. Section 33-18-01-05 Protection of Groundwater Sources requires specific grouting and construction features to ensure the protection of groundwater.
c. Siesmic holes	Chapter 38-08.1 Geophysical Exploration Requirements		SIC and Counties	The statute sets requirements for geophysical exploration including requirements for plugging and abandoning drilled holes.
6. Subsurface sewage disposal				
a. Drainfield systems b. Mound system c. Cesspools	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Waters	Guidelines	WSPC	The statute requires the submission of plans and specifications for public subsurface disposal systems. Individual systems are approved by local health units. The Department has established guidelines for the construction, operation, and maintenance of subsurface disposal systems.
d. Septage	Chapter 23-19 Liquid Wastes and Commercial By-products	Chapter 33-21-01 Operation of Cleaning, Pumping, and Servicing of Cesspools, Septic Tanks, or Privies	WSPC	The statute requires all septic tank pumpers to obtain a license. The rules require pumpers dispose of waste in a manner which will not endanger groundwater.
7. Land application of wastes				
a. Wastewater irrigation	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Waters	Guidelines	WSPC	All wastewater irrigation projects including the plans and specifications are reviewed and approved by the Department. Groundwater monitoring is required on a case by case basis.
b. Land application of sludges	Chapter 23-29 Solid Waste Management and Land Protection Act	Chapter 33-20-05 Standards for Peformance for Disposal Operations	HWM-SS	The rules establish permitting requirements for sludge disposal.
8. Accidental spills				
a. Hydrocarbons b. Chemicals	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Waters	Response Plans	WSPC	The Department utilizes the Pollution Control Contingency Plan for Oil and Hazardous Materials when accidental spills occur.
c. Salt water			SHP	The patrol utilizes the Pollution Control Contingency Plan for Oil and Hazardous Materials when accidental spills occur.
d. Hazardous material	Chapter 23-20.3 Hazardous Waste Management	Chapter 33-24-06 Standards for Transporters	HWM-SS	The rules specify the type of immediate action to be taken and cleanup responsibilities in the event of a spill.

TABLE I (Continued)

SOURCES OF GROUNDWATER CONTAMINATION	STATUTES GOVERNING SOURCES OF CONTAMINATION (NORTH DAKOTA CENTURY CODE)	RULES ESTABLISHED UNDER STATUTE (NORTH DAKOTA ADMINISTRATIVE CODE)	GOVERNING AGENCY*	BRIEF DESCRIPTION OF REGULATORY AUTHORITY AND GUIDELINES
9. Mining				
a. Mine development b. Reclamation	Chapter 38-14.1 Surface Mining and Reclamation Operation	Article 69-05.2 Surface Mining and Reclamation Operation	PSC	Chapter 69-05.2-16 Performance Standards-Hydrologic Balance-general requirements include groundwater protection and groundwater monitoring requirements for mine development and reclamation to protect groundwater. Chapter 69-05.2-25 Performance Standard Operations in Alluvial Valley Floors-This section establishes requirements to protect groundwater systems surrounding a mine area and to ensure reestablishment of groundwater systems.
	Chapter 61-02 State Water Commission	Chapter 89-04-08 Groundwater Protection		The rules set forth groundwater monitoring requirements to determine the effects of surface coal mining and reclamation on groundwater.
10. Oil and gas development				
a. Blowouts	Chapter 38-08 Control of Gas and Oil Resources	Chapter 43-02-03 General Rules Oil and Gas Development	OGD	Section 43-02-03-23 Blowout Prevention-requires blowout prevention equipment.
b. Reserve pits				Section 43-02-03-19 Pit for Drilling Mud and Drill Cuttings-requires lined pits to prevent groundwater contamination.
c. Evaporation ponds				Section 43-02-03-53 Saltwater Handling Facilities-prohibits evaporation ponds.
d. Communication between water bearing strata				Section 43-02-03-20 Sealing of Strata-all oil, gas, and water formations above the production zone must be sealed.
e. Abandon wells				Section 43-02-03-(33-36) Abandonment and Plugging of Wells-requires plugging of abandoned wells.
11. Underground storage tanks				
a. Hydrocarbons	Chapter 18-01 Fire Marshal Department	Chapter 10-07-01 Fire Marshal	FM	Rules specify National Fire Protection Association Standards for storage and handling of hydrocarbons.
b. Hazardous material	Chapter 23-20.3 Hazardous Waste Management	Chapter 33-24-05 Standards for Treatment, Storage, and Disposal Facilities	HWM-SS	Sections 33-24-05-(103-109) Tank Requirements-establishes design standards for tanks to protect groundwater.
12. Agricultural chemical application - dry land				
a. Fertilizer				
b. Pesticide	Chapter 4-35 Pesticide Act	Chapter 4-35-01 Pesticide Control Board	AGD	The rules regulate the labeling and use of pesticides and establish a pesticide control board.

TABLE I (Continued)

SOURCES OF GROUNDWATER CONTAMINATION	STATUTES GOVERNING SOURCES OF CONTAMINATION (NORTH DAKOTA CENTURY CODE)	RULES ESTABLISHED UNDER STATUTE (NORTH DAKOTA ADMINISTRATIVE CODE)	GOVERNING AGENCY*	BRIEF DESCRIPTION OF REGULATORY AUTHORITY AND GUIDELINES
13. Agricultural Irrigation				
a. Leaching of salts and pesticides	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Water		WSPC	The Water Commission and the Health Department can reduce or discontinue an irrigation project if they feel it may cause groundwater contamination. This decision may be based on groundwater monitoring or applied research. The Water Commission issues permits for all irrigation projects and monitors both groundwater quality and quantity.
	Chapter 61-04 Appropriation of Water		SWC	
	Chapter 61-24 Garrison Diversion Conservancy District		AGES	Section 61-24-20 of the statute requires groundwater monitoring and best management practices for all irrigation associated with Garrison Diversion.
b. Chemegation	Chapter 61-04 Appropriation of Water		SWC	The Water Commission requires specific well construction and backflow prevention equipment in the irrigation permit to prevent groundwater contamination.
14. Road salt application	Chapter 61-28 Control, Prevention, and Abatement of Pollution of Surface Water		WSPC	Sand is used much more frequently than salt on North Dakota highways. Therefore, the state has experienced no problems associated with de-icing of highways.
15. Other	Chapter 61-28.1 Safe Drinking Water Act	Chapter 33-17-01 Public Water Supply Systems in North Dakota	WSPC	The rules establish sampling and monitoring requirements and maximum chemical and biological contaminant levels for public water systems. Under this program, all public water systems are monitored to ensure clean drinking water and to detect trace contaminant levels prior to them becoming a public health hazard.

*NORTH DAKOTA STATE GOVERNING AGENCIES

AGD - Agriculture Department
AGES - Agricultural Experiment Station
FM - Fire Marshal
HWM-SS - Department of Health-Division of Hazardous Waste Management and Special Studies
NDGS - Geological Survey
OGD - Industrial Commission-Oil and Gas Division

PSC - Public Service Commission
SHP - Highway Patrol
SIC - Industrial Commission
SWC - Water Commission
WSPC - Department of Health-Division of Water Supply and Pollution Control

OREGON

Water quality management in Oregon is addressed in a variety of programs. The the principle responsibility lies with the Water Quality Division of the Department of Environmental Quality, which operates under the direction of the Environmental Quality Commission. Water quantity issues are addressed by the Water Resources Department, which functions under the direction of the Water Resources Commission. Drinking water matters fall within the jurisdiction of the Department of Human Resources' Health Division. State programs are financed with general funds and federal grants.

Ground water quantity and quality conflicts are generally resolved informally on a case-by-case basis. The Environmental Quality Commission's ground water policy recognizes the authority and responsibilities of the Water Resources Department and Water Resources Commission and is intended to compliment their efforts in the management and protection of ground water.

Ground Water Allocation

In Oregon, ground water use is governed by the Ground Water Act of 1955, as amended, which generally defines ground water to include any water beneath the land. Ground water use is regulated by the Water Resources Department through a permit system. Stock watering, domestic, industrial, and commercial uses not exceeding 5,000 gallons per day are exempted from regulation. Also exempt is the use of down-hole geothermal heat exchangers. Administrative rules encourage reinjection of spent low-temperature effluent to conserve heat and water. Water rights established prior to enactment of the Ground Water Act are recognized and confirmed, to the extent of maximum beneficial use up to 1955. Water rights commenced prior to enactment and completed within a reasonable period of time thereafter are also recognized. Any user claiming a prior vested right was required under the Act to register with the Department Director and obtain a certificate evidencing his right. Failure to register within a set time period (which was extended to 1962) constituted abandonment. A certificate is not deemed to be a final determination of the extent of the right, because the right is still subject to adjudicatory determination proceeding.

With respect to new rights, an applicant must file for a permit with the Water Resources Commission. Protests against issuance of a permit may also be filed, and the Commission may approve the application if it concludes there is unappropriated water available which can be put to beneficial use without impairing prior rights. Applications may be approved subject to conditions to prevent impairment of prior rights, wasteful use, and to protect the public welfare. If approved, ground water use applications have a priority dating from their filing with the Commission. The applicant must proceed with reasonable diligence to put the water to beneficial use, but upon showing of good cause the Commission may extend the time limitations. Upon proof of completion of work, the Commission issues a certificate evidencing the perfected right. Certificates and permits may be assigned, but are not binding except on the parties thereto unless recorded in the Department.

The Commission is responsible for identifying and defining the location, extent and characteristics of ground water reservoirs in the State, but before finalizing boundaries it is to make a final determination on the rights to the use of the water. Such a determination can be made upon its own initiative or upon the petition of users of the reservoir. Subsequently, conflicting claims are adjudicated in the same manner as surface streams. In the end, the nature and extent of individual rights, boundary of the reservoirs, lowest permissible water level, acceptable methods of diversion, and rules for controlling water use are established by order of the Commission, whose findings and order are filed with the court having jurisdiction over the matter. Following adjudication, the Commission issues each user a ground water certificate evidencing his right.

Upon its own initiative, or the petition of basin water users, the Commission may initiate proceedings to determine critical ground water areas where: (1) water levels are declining excessively; (2) there is substantial interference between users; (3) ground water supplies are overdrawn; (4) water quality is deteriorating; or (5) interference is occurring between ground water appropriation and geothermal development. Following notice and hearing procedures, the Commission may define the boundaries of the critical ground water area and may take corrective measures such as: (1) denying future appropriation permits; (2) determining the amount of permissible total withdrawal under existing rights; (3) establishing preferences among uses without regard to priority of rights; (4) reducing withdrawals by individual users; (5) requiring pollution abatement; or (6) requiring rotation of ground water usage among users. These procedures control ground water mining and provide some protection for prior ground water users in their means of diversion.

In addition to authority for control of critical areas, the Commission has other authority to control ground water use and development. Under certain circumstances, the Commission may withdraw a ground water reservoir from future appropriation and refuse to accept additional ground water permit applications. The Commission may also classify a ground water reservoir, or part thereof, for specific uses. Under such classification, applications for ground water permits would be accepted only for the uses specifically indicated.

The state has established rules and regulations prescribing general standards for the construction and maintenance of water wells, and requires the licensing of water well constructors. A well constructor must notify the Commission prior to commencing work and must submit a well constructor's log within 30 days after completion.

The State has no active artificial recharge program, but Oregon law discusses recharges and describes the type of permit required to carry out such activities. There is no specific conjunctive use program.

Ground Water Quality

A number of Oregon statutes define measurable environmental standards for the protection of surface water, including control of point source discharges. With ground water protection, the case is not comparably clear. The Department of Environmental Quality (DEQ) through the authority of the Environmental Quality Commission (EQC) is developing ground water standards and an aquifer classification system. Until these are developed, the State will continue to follow its ground water policy as described below.

Two legislative policy statements which relate generally to pollution control and the appropriation of water provide that the impairment of ground water by pollution be prevented or controlled within practicable limits. Specifically, the legislature has declared that it is the policy of the State to protect, maintain, and improve the quality of the waters of the State for beneficial uses and to provide that no waste be discharged into any waters without first receiving the necessary treatment or other corrective action to protect beneficial uses, and to provide for the prevention, abatement, and control of new or existing water pollution.

EQC adopted a general ground water quality protection policy in 1981. It states that EQC will minimize the impairment of natural ground water quality within practicable limits to protect present and future beneficial uses. DEQ, with the assistance of the Water Resources Department is to design an ambient monitoring program adequate to determine long-term quality trends for significant ground water flow systems. The ground water policy was revised in 1984 to include Problem Abatement Policies to better control urban areas where ground water is being degraded as a result of individual on-site sewage disposal practices and to establish better control over individual source activities.

Consistent with general EQC policies for the protection of surface water, the highest and best practical treatment and control of sewage, industrial waste and landfill leachates is required, so the potential for ground water pollutant loading will be minimized. In arriving at a case-by-case determination of highest and best practicable treatment and control, energy, economics, public health protection, potential present and future value of the ground water resource, the time required for recovery from ground water degradation and other factors are considered. More stringent controls may be required in specific areas, including critical areas designated by the Water Resources Commission for reasons of quality and EPA designated sole source aquifers under SDWA. Less stringent controls may be approved by EQC upon a showing that lesser controls will adequately protect beneficial uses.

Existing subsurface, solid waste, and hazardous waste guidelines also address ground water protection. Disposal of wastes onto or into the ground in a manner which allows potential movement to ground water is regulated under the existing DEQ rules for water pollution control permits. These permits specifically include ground water quality protection and monitoring and reporting requirements, as do solid waste disposal facility permits issued for landfills and sludge disposal.

Although Oregon does not have a comprehensive statewide assessment plan, all point sources are covered through existing programs. In addition to solid and hazardous waste guidelines, underground storage tank and on-site sewage disposal programs have ground water protection as a component within their permitting processes.

Under the Oregon State Land Use Act, local communities and counties must develop comprehensive land use plans which address identified ground water problems. These aquifer-protection plans often utilize density requirements to protect an aquifer. While in most instances these authorities are adequate, in certain areas special control measures are necessary to insure protection of ground water quality for beneficial use.

At the present, non-point source pollution of ground water is more difficult to monitor and control. The only mechanism to strictly preserve the quality of an aquifer is to declare it a sole source aquifer. This limits growth and land use in the affected area. Because of limited funding DEQ considers ground water problems on a case-by-case basis and acts on those problems which are most pressing and which have the greatest impact on the environment.

No current ground water standards incorporate an acceptable risk-factor into the standard, nor is there interest in DEQ in establishing this kind of approach. Oregon's main emphasis is anti-degradation, with some reliance on federal primacy and secondary drinking water standards and maximum contaminant levels.

DEQ has emergency authority and capability to respond to ground water problems primarily through its ability to affect activities under state permit, whether these activities relate to solid waste facilities, water pollution control facilities or subsurface sewerage. With respect to the latter, EQC can place an immediate moratorium on the issuance of septic permits, thus halting construction of any new units in an area. Further, under the point source permit program, immediate action can be taken against permittees.

The State has been delegated primacy for EPA's UIC program. Injection wells for subsurface disposal are not generally utilized in Oregon. However, in eastern Oregon it was an acceptable practice for some time to drill a "dry hole" for the disposal of urban runoff, sewage waste, etc. DEQ policy now prevents such practices and existing wells are being phased out. In some geothermal areas, reinjection wells are used for spent fluids, and another major underground injection disposal practice involves air conditioning cooling water. Other than for these purposes, the Department does not allow pressurized injection of waste into the ground.

SOUTH DAKOTA

Ground water is a valuable resource in South Dakota. Over 90% of the public water supply systems in the State rely on it for domestic use. Fortunately, the State has experienced only minor ground water contamination problems. Ground water protection programs have been initiated and are maintained by the South Dakota Department of Water and Natural Resources (DWNR).

Ground Water Allocation

South Dakota allocates ground water under the doctrine of prior appropriation. Rights to ground water are created and administered under traditional prior appropriation principles.

The state provides protection for prior ground water appropriators against junior users depleting an aquifer system. However, the dependence on artesian pressure to convey water to a pump located above an aquifer formation is not protected. The level of protection is grounded on reasonable means of diversion by senior appropriators. Ground water mining is prohibited under South Dakota law. Mining is defined as withdrawal which exceeds the average annual recharge of an aquifer system. Water distribution systems withdrawing water from any ground water formation older than, or stratigraphically lower than, the Greenhorn formation are excepted from this prohibition.

South Dakota does not have an active conjunctive use program, but conjunctive use policies have been developed. Where an aquifer is obviously interconnected with surface water, such as on the Rapid Creek in western South Dakota, the ground and surface waters are considered the same and regulated as one system. On such systems, the direct impact of pumping is mitigated by requiring proper spacing of wells from the stream channel. Where there is no obvious connection between surface and ground water the waters are regulated separately.

Conflicts between ground water quality regulation and ground water quantity allocation are usually handled informally within DWNR. For example, the chemical quality of ground water is considered when applying for a permit to appropriate water for irrigation. Also, soil and water compatibility approval is required before a permit to appropriate may be approved.

South Dakota has no artificial recharge program for aquifer storage. The State licenses well drillers and requires wells to meet certain legal specifications.

Ground Water Quality

South Dakota law establishes DWNR as the primary state agency for the protection from pollution of both ground and surface water. Legal authority for both preventive and corrective measures is included. Also included are categorical environmental programs which protect ground water. These include point and non-point source pollution control activities, public water supply protection, underground injection control, exploration and mining regulatory activities, oil and gas conservation activities, the construction grants program, solid waste management activities, and hazardous waste management.

The South Dakota DWNR conducts investigations of special ground water quality problems including chemical and petroleum spills. DWNR gathers information on ground water resources through county and area-wide studies. The State is in the middle of an extensive study to evaluate the resources and water quality of the Big Sioux Aquifer in eastern South Dakota.

The only ground water classification system adopted by South Dakota is the system incorporated in the federal UIC program. Aquifers which contain less than 10,000 milligrams per liter total dissolved solids are protected and can not be utilized for disposal unless they are exempt under UIC rules.

South Dakota's ground water protection controls are source oriented. Potential contamination sources are controlled through permitting, such as UIC permits, mining permits, and the like. Critical recharge areas and vulnerable aquifers are given special consideration in the permitting process. Land use control is carried out by cities and counties under their zoning ordinances.

At the present, the surface water quality standards and drinking water standards are used to establish ground water protection policies. The South Dakota drinking water standards are similar to the federal standards and rely largely on federal standards for determination of acceptable levels of risk.

South Dakota statutes provide that the Board of Water Management shall formulate and issue standards for water quality and classification of water according to beneficial use. In formulating these standards the following factors are considered: the environment; technical, social, and economic values; present use; adversely affected parties; natural background waters in relation to contaminants and pollutants contained in them; and, existing degradation and irretrievable man-induced conditions. The standards are designed to protect the public health and welfare and the use of water for public water supplies, propagation of fish, aquatic life and wildlife, recreational purposes, and agricultural, industrial, and other uses.

South Dakota was delegated partial primacy under the UIC program in 1984. Its application for primacy in remaining activities is pending with EPA. The use of injection wells for subsurface waste disposal in the State is limited primarily to salt water disposal. Most injections wells are air injection wells used for enhanced oil recovery. To date there have been no documented cases of underground injection contaminating a drinking water supply.

The South Dakota Office of Air Quality and Solid Waste has established permitting and siting standards for the land disposal of hazardous waste in order to protect ground water quality. Under the State's general Emergency Response Plan, which outlines local, state, and federal responsibilities and roles in emergency situations, the State has capabilities to deal with emergencies which might affect ground water quality. The majority of South Dakota's environmental programs, including those implemented to protect ground water quality, are funded primarily from EPA program grants. Such grants range in federal funding from 75 to 100%.

TEXAS

In Texas, ground water quality problems due to the activities of man are not significant, although in years past localized areas have been polluted or impacted by nonregulated or noncompliant activities. This has caused pockets of pollution immediately around the source, but there are no statewide or aquiferwide quality problems. Most of the unregulated activities of the past have been brought under regulatory control, and noncompliant activities are being corrected through administrative and enforcement remedies under state and federal law.

Ground water quantity problems in Texas are significant. Widespread aquifers underlie about 76 percent of the State's land surface. There are seven major aquifers and 17 minor aquifers from which ground water withdrawals have increased in the last 40 years from 700,000 acre-feet annually to about 11 million acre-feet in 1984. Water quality has remained acceptable for existing uses. Existing utilization in several major aquifers has resulted in significant depletion of ground water supplies. Depletion of some aquifers has been projected for the foreseeable future. Locally, problems with salt water intrusion and land subsidence have increased.

State agencies have very limited authority and responsibility for ground water quantity management. However, the State water code does provide for the creation of underground water conservation districts with broad powers to regulate well spacing and pumpage. Several conservation districts have been formed, but a significant part of the ground water resources of the State are not within the jurisdiction of the currently active underground water districts.

During 1985, the State Legislature enacted and the voters approved House Bill No. 2, Article 5, which dealt with revisions of Chapter 52 of the Texas Water Code, relating to new programs dealing with the acceleration of the creation of underground water conservation districts, the creation of districts in critical areas, and the monitoring of the underground water in certain areas of the State. When state monitoring indicates areas which are experiencing or are expected to experience critical ground water problems (including shortages of surface or ground water, subsidence or contamination), the State has a mechanism to delineate the boundaries of the critical area and to order a local election on whether to form an underground water conservation district. These districts, as well as districts formed solely by local initiative, have been given expanded powers, including mandatory permitting of wells.

The Texas Water Development Board is the Texas State agency with responsibilities related to financing water resource projects, water development planning, and water resources studies, investigations, and data collection. The Texas Water Commission is the agency with responsibilities related to administration of water resources use and water quality protection. The two agencies composed the former Texas Department of Water Resources, which was abolished on September 1, 1985. Some responsibilities for ground water quality protection are shared with the Texas Railroad Commission and the Department of Health. Underground water management including conjunctive use of ground and surface waters, is one of several issues which were addressed in the recently amended Texas Water Plan. All state programs are financed by legislative appropriations, which are supplemented with federal funds such as CWA, RCRA, and UIC funds.

Ground Water Allocation

The State has appropriation codes only for ground water flowing in underground streams. However, Texas courts have presumed that ground water is not in such streams but is percolating and is owned by the surface owner. A landowner may take all the ground water he can capture so long as the water is not wasted. The water may be used on or off the land from which it is withdrawn and may be sold to others. Further, a law passed by the Texas Legislature in 1965, to prohibit the interstate transfer of ground water supplies purchased by an Oklahoma municipality from Texas landowners, was struck down as unconstitutional on the grounds that the water was personal property and that such a prohibition on transfer was an undue burden on interstate commerce. The federal court decision was upheld by the Supreme Court.

The State cannot currently prohibit the mining of ground water, although underground water districts may regulate well spacing and pumping rates. The State licenses well drillers and has general well construction and plugging requirements.

Ground water districts can provide limited protection to prior ground water users through well spacing regulations. Also, the State does not conjunctively address water quality regulation and ground water allocation conflicts. The State is not directly involved in artificial recharge programs, although local underground water conservation districts, which are created by the State government, do conduct such programs.

Ground Water Quality

As described above, the State has a limited role in ground water quantity management, but extensive efforts have been devoted to protecting ground water quality through monitoring, planning, technical assistance, and control of pollution through administration of state and federal legislation. Primary state legislative authority dealing with ground water quality comes from the Water Quality Act, Injection Well Control Act, and other legislative authority contained in the Texas Water Code and the Solid Waste Act. Under the State's Natural Resources Code, water quality is further protected by control of ground water used for oil and gas production. Underground storage of hydrocarbon products is also regulated.

The State has emergency response authority under the Texas Water Code, the CWA, and "Superfund." Further, the State has developed an oil and hazardous spill response plan.

It is the policy of the State to maintain the quality of water, including ground water, consistent with public health and welfare, economic, and environmental goals. The Texas Water Commission is authorized to issue permits establishing treatment requirements for waste discharged into or adjacent to any water, as well as to specify the conditions under which the discharge may be made. The Executive Director of the Commission is required to prepare a State Water Quality Management Plan to be approved by the Commission. The Commission is statutorily required to set surface water quality standards, and has exclusive jurisdiction to do so.

Waste discharge permit applications are submitted to the Commission to be formally approved or denied by the Commission. Upon NPDES delegation to the State, no permit may be issued authorizing the discharge of any radiological, chemical, or biological warfare agent of high-level radioactive waste. The Commission may also refuse to issue any type of permit violating the provisions of any state or federal law, rule, or regulation. Construction of waste treatment facilities may not be commenced prior to the issuance of a permit to discharge waste from a facility, except with the approval of the Commission. The Commission may prescribe reasonable requirements to monitor and report waste collection, treatment, and disposal activities. The Commission's Executive Director may request the State Attorney General to initiate a civil suit to enjoin violations of the law, and subsequently seek civil penalties. The Commission may also impose administrative penalties, usually fines, in lieu of civil suites.

The Commission provides Section 401 certification under the federal CWA and may pass rules and regulations governing the discharge of dredge and fill materials. The Texas Parks and Wildlife Department also has authority to regulate gravel dredging or mining operations within stream channels.

Texas has not adopted a ground water aquifer classification procedure, although ground water quality is classified on the basis of concentration of total dissolved solids. Aquifers can be designated for waste disposal, but not to the exclusion of all other uses. No aquifers or portions of aquifers have been so designated. Rather, control is exercised through the permit program, and requests for disposal of wastes into an aquifer are considered on a case-by-case basis.

The State has been delegated responsibility for the federal UIC program, and the disposal of waste by deep well injection is prohibited, except when authorized by permit. Permits are site-specific with conditions determined on a case-by-case basis. Class I industrial waste disposal wells are extensively used, but the main type of underground injection wells used in the State for the disposal of salt water produced from the exploration, development and/or production of oil and gas are Class II wells. UIC Class II wells involving solution mining of uranium, sodium sulphate, sulphur, and the like are also numerous. Of all injection wells currently in use, salt water disposal wells total about 40,000, solution mining wells 9,000, and 130 permitted industrial waste wells.

Ground water quality is also protected through other policies and procedures authorized under the Texas Water Code and Solid Waste Act. Pursuant to this legislation, the Commission has developed design standards for waste treatment and storage facilities, manages waste disposal practices through terms and conditions placed in permits, and has adopted rules, regulations, and guidelines necessary to protect ground water quality.

The State has issued orders to protect ground water quality in critical aquifer recharge zones which contain restrictions or controls that affect land use. Further, the State has developed siting guidelines and permit requirements for the land disposal of hazardous waste.

UTAH

In 1984 an Executive Order was issued by the Governor defining Utah's ground water policy. This order directed the Department of Health to develop a ground water quality protection strategy "...under existing statutory authority with the coordination of affected agencies and interested parties and with public involvement." The order directed that "The quality of ground water will be protected to a degree commensurate with current and probable future uses."

Staff members of the Health Department's Bureau of Water Pollution Control in cooperation with representatives from various State and local agencies, state universities, and industry are developing a report describing the concepts, influences, uses, sources of contamination, and current laws and regulations protecting the State's ground water. This study will provide the basis for the development of a comprehensive cooperative program to protect Utah's ground water quality for present and future generations.

Currently, six federal pollution control laws administered by EPA provide for some protection of ground water in Utah. They are the SDWA, RCRA, CERCLA, CWA, Toxic Substance Control Act (TSCA) and Federal Insecticide Fungicide and Rodenticide Act (FIFRA). These laws and their State functional equivalents provide the basis for current federal and State ground water protection programs.

Utah currently has a number of programs that provide some protection for ground water quality. The State has assumed or is assuming primacy for those federal programs for which primacy is available. Ground water classification and water quality standards in addition to the current public drinking water standards are being studied in conjunction with the development of the ground water protection strategy. Funding for these programs is derived both from federal grants and state legislative appropriations.

Utah has a number of places where ground water contamination has been documented. The eight National Priority List or "Superfund" sites in Utah have varying degrees of ground water contamination present. Ground water contamination is also known to exist at a number of mine and mill sites, industrial plants, refineries, and military installations and is suspected at many landfills. The State has one approved operating site for disposal of hazardous wastes.

Administrative agencies that regulate ground water in Utah are located in the Departments of Health and Natural Resources. The Division of Environmental Health within the Department of Health is primarily concerned with protecting the quality of surface and ground water. Four bureaus in the Division have responsibility for a variety of ground water protection programs. These include the Bureau of Water Pollution Control, Bureau of Solid and Hazardous Waste Management, Bureau of Public Water Supply, and Bureau of General Sanitation. The Department of Natural Resources includes agencies that allocate ground water to users, provide technical and financial assistance in the development of surface and ground water resources, regulate the exploration and production of oil and gas through the usable ground water zone, and study the geologic setting of the State's ground water resources. These agencies are, respectively, the Division of Water Rights, Division of Water Resources, Division of Oil, Gas and Mining, and the Utah Geological and Mineral Survey.

The Department of Agriculture does not have direct involvement in the regulation of ground water. However, it regulates some agricultural activities that may affect ground water quality.

Following is a more detailed discussion of the major State agencies within the Departments of Health and Natural Resources that are concerned with ground water quality.

Bureau of Water Pollution Control

The Utah Water Pollution Control Act, UCA 26-11-01 et seq., created the present Utah Water Pollution Control Committee and defined its powers and duties. This statute delegates to the Committee broad authority to develop programs for the prevention, control, and abatement of new or existing pollution of the "waters of the State." "Waters of the State" are defined to include all surface and underground water. The authority includes provisions for conducting investigations, establishing quality standards, classifying waters, regulating dischargers, reviewing plans and issuing construction permits for treatment plants, and adopting rules for governing underground injection.

While the Committee determines water pollution control policy for the State, the Bureau of Water Pollution Control is delegated the administrative duties necessary to accomplish the Committee's goals. The Bureau is organized into four sections: Planning, Engineering and Construction Grants, Monitoring, and Permits and Compliance.

The Permits and Compliance Section has the most direct involvement in programs that protect ground water quality. In addition to the current effort to develop a ground water quality protection strategy for Utah, personnel of this Section manage the UIC program, surface disposal of produced brines from oil and gas wells, and the NPDES program. Also, plans for facilities that will discharge to ground water are reviewed by the Permits and Compliance staff. The State UIC program is based on federal regulations developed by EPA. Partial funding is provided through a federal grant. Under the UIC program, wells that are used for disposal of water or wastes, and wells used for mineral extraction are regulated. Although the State does not prohibit the use of injection wells for subsurface waste disposal, none are permitted at this time. Wells used for production of oil and gas or reinjection of produced water are regulated by the Division of Oil, Gas and Mining.

Regulations adopted by the Utah Water Pollution Control Committee set standards for the construction and operation of produced water disposal ponds. These regulations establish requirements for containment with natural soil, clay or artificial liners, and monitoring of ground water adjacent to the disposal pits.

When a proposed facility will discharge to ground water, plans are reviewed prior to issuance of construction permits by the Bureau. Examples of regulated ground water discharges include sewage lagoons and mine tailing ponds.

The NPDES program is currently in transition with responsibility for the program being shifted from the EPA to the State. The State must adopt regulations equivalent to the federal NPDES regulations and hire staff to administer the program before the transfer will be complete.

Bureau of Solid and Hazardous Waste Management

The Utah Solid and Hazardous Waste Act, UCA 26-14-1 et seq., placed the authority to regulate the disposal of solid and hazardous wastes with the Solid and Hazardous Waste Committee. The Committee is authorized to promulgate rules to control the collection, transport, storage, treatment, and disposal of solid and hazardous wastes for the protection of the public health. The Act grants the Committee broad authority to develop information through hearings, testimony of witnesses under oath, and production of documents, and to enforce regulations through the issuance of orders and instigation of judicial proceedings. As part of its rule making authority, the Committee has adopted regulations equivalent to those of RCRA. However, recent amendments to RCRA passed by Congress in 1984 have not yet been adopted in an equivalent form by the State.

The current CERCLA program is scheduled for reauthorization in 1986. Both the U.S. House and Senate versions of the reauthorization bill provide increased funding and mandate that new standards be set and new time-tables for cleanup be established.

Bureau of Public Water Supplies

The Utah Safe Drinking Water Act, UCA 26-12-1 et seq., authorizes the creation of the Utah Safe Drinking Water Committee and empowers it to adopt and enforce rules to protect the public drinking water systems. The Committee membership is appointed by the Governor from individuals representing local governments, municipalities, water districts, industry professional groups, and the public. The Committee has adopted rules in conformity with those of the federal SDWA. Administration of these rules is carried out by the Bureau of Public Water Supplies.

The Bureau operates through the Compliance Section and Engineering Section. Compliance handles the inspection, monitoring, and preparation of periodic reports to assure Utah's public water systems are in compliance with the national drinking water standards. The Engineering Section is concerned with the construction of public water systems. The Engineering staff oversees the development of public water supplies from planning through construction. The Bureau has established regulations for water wells used as public water supplies. Through a loan program it is also involved in financing water supply systems. The Utah Safe Drinking Water Act also provides for the adoption of rules to protect watersheds and water sources used for public water systems.

Bureau of General Sanitation

The Bureau of General Sanitation, established by the Utah Legislature, UCA 26-15-2 et seq., has the authority to establish and enforce rules for individual wastewater disposal systems. The Bureau has developed minimum standards for these systems. They are enforced by local health departments. The standards include limits on wastewater quantity, location, and elevation above the ground water table that are designed to provide protection for the ground water resource.

Division of Water Rights

The Division of Water Rights was established by the Utah Legislature, UCA 73-1-1.1 et seq. The State Engineer is appointed by the Governor and is the Director of the Division. The Division is responsible for use allocation, development, and protection of the waters of the State. Under the Geothermal Resource Conservation Act (UCA 73-22-1 et seq.), DWR was granted authority to regulate geothermal exploration and development.

Utah defines the waters of the State as public property. The right to use the water is based on the date of application. Later applicants may not interfere with rights of earlier grantees. Proof that the water has been produced and is being used according to the application must be furnished to perfect the water right.

The Division of Water Rights exercises its authority to prevent pollution of the State's ground water through well drillers regulation and licensing, prevention of pumping in excess of recharge of ground water basins, and regulation of geothermal exploration and development.

Division rules for water well drillers provide for licensing of drillers, operator registration, and minimum well construction standards. To receive a license an individual or company must pass an examination and post a bond of $500.00. Company operators are required to register with the State and pass an examination similar to that for a license applicant. The construction standards set minimum requirements for development, completion, and abandonment of water wells.

The Division is paying increased attention to the inter-relationship between water pumpage and ground water quality. Pumping of ground water basins in excess of their recharge will result in gradual deterioration of the quality of the water as the ground water is mined. In the future, population growth will result in increased pressure to mine ground water.

In 1981, the legislature assigned regulatory authority for the exploration and development of geothermal resources to DWR. Geothermal resources are defined as waters with temperatures higher than 120°C. Ownership is based on land ownership in a manner similar to mineral or hydrocarbon ownership. Water under 120°C is appropriative and is the property of the State.

The Division has developed regulations for permitting, drilling, and development of geothermal resources. Exploration wells such as temperature gradient wells, observation wells, and wells drilled for geologic information, as well as field development wells, are included under the regulations. The regulations include requirements for casing and abandonment that are intended to protect ground water quality.

Wells used to reinject spent geothermal fluids are jointly regulated by the Division of Water Rights and the Bureau of Water Pollution Control. While the former is concerned with the engineering and operational aspects of the well, the latter is concerned with prevention of ground water contamination.

The State does not have a conjunctive use or artificial recharge program. However, some projects are currently being discussed.

Division of Water Resources

The Board of Water Resources was established by the Legislature (UCA 73-10-1 et seq.) to encourage the use of the State's water resources in a manner that best serves the needs of the people of Utah. The Board's duties include protection of Utah's rights to interstate waters, coordinating federal water programs, comprehensive planning for water resource usage, and administration and funding of water conservation and development projects. The Board is not granted regulatory authorities to accomplish its goals although it does have recourse to the courts. The Division of Water Resources is the administrative arm of the Board and carries out the policies established by the Board.

In its capacity to plan for water use and fund water development projects, the Division has established a significant involvement in ground water issues. Through cooperative agreements with the USGS, the Division has participated in many investigations of Utah's ground waters. These studies have built a substantial base of technical knowledge for the development of sound ground water management policies. Where community water systems have a potential health problem, the Board is authorized to assist in funding improvements to municipal water systems. These improvements can include development of ground water resources for public use.

Division of Oil, Gas and Mining

The Division of Oil, Gas and Mining was established by Utah law (UCA 40-6-1 et seq.) to administer policy and regulations adopted by the Board of Oil, Gas, and Mining. The Division oversees oil, gas, and mineral exploration, production, and related activities such as mined land reclamation; injection of produced water from oil and gas wells; and, coal mining and coal mine reclamation. The Board was established by the same legislation and consists of seven members with various specified backgrounds appointed by the Governor and confirmed by the Senate.

The Oil and Gas Conservation Rules set standards for exploration, drilling, and production practices. Seismic operators must provide adequate protection to ground water resources by plugging drill holes with bentonite slurry and setting surface plugs with soil and in the upper three feet of the drill hole. In drilling exploration or production wells, operators must install and cement casings designed to protect the ". . . reasonably estimated, utilizable domestic, fresh water levels." The casing must also prevent the migration of oil, gas, or water from one horizon to another. Reserve pits must be constructed so as to prevent the escape of salt water or oil-field wastes. When a well is to be abandoned, plugs must be set to prevent fluid migration in the well bore. This includes a 100-foot plug centered across the base of the fresh water zone and a 50-foot plug at the base of the surface casing string.

The Division also regulates wells used for disposal of brines and to enhance recovery of oil and gas. These wells, designated as Class II wells, are regulated under the UIC program. Funding for the program is provided by EPA. Regulation is carried out through permitting and includes requirements for plugging nearby wells, monitoring pressure during operation, and periodic reporting of operating data.

The Coal Mining and Reclamation Act (UCA 40-10 et seq.) established the basis for the Board of Oil, Gas, and Mining to regulate coal mining and reclamation operations. The performance standards included in the Act require that the operator "minimize the disturbances to the prevailing hydrologic balance at the mine site and in associated off-site areas and to the quality and quantity of water in surface and ground water systems both during and after surface coal mining operation . . ."

Utah Geological and Mineral Survey

The Utah Geological and Mineral Survey (UGMS) (UCA 53-36-1 et seq.), is a nonregulatory agency within the Department of Natural Resources. Policy for UGMS is set by the Board of the Utah Geological and Mineral Survey. In broad terms, UGMS is charged with the responsibilities of investigation and distribution of information about the State's geology and mineral resources. Specifically its authority includes the study of ". . . all energy resources including geothermal, . . ." and ". . . all mineral bearing waters and other surface and underground water supplies." In addition, the implementation portion of the Utah Ground Water Policy states that UGMS shall identify areas where shallow ground water conditions create a geologic hazard and make recommendations for mitigation or avoidance.

UGMS, as an agency concerned with the development of knowledge and understanding of the State's geology, is involved with many ground water management issues. A knowledge of the geology of an area is indispensable to the understanding of the ground water hydrology. Geologic and hydrologic data collected by UGMS, U.S. Geological Survey, the Division of Water Resources and other agencies form the basis for intelligent policy decisions on many ground water issues.

Department of Agriculture

The Utah Department of Agriculture exercises regulatory authority over a number of activities that are potential non-point sources of ground water contamination. Both fertilizers and pesticides must be registered with the Department for use in the State. The Utah Pesticide Control Act (UCA 4-11-1 et seq.) requires registration, proper labeling, certification of applicators, and licensing of dealers. The Utah Fertilizer Act (UCA 4-13-1 et seq.) requires registration, labeling, and verification of performance claims. However, neither the Utah Pesticide Control Act nor the Utah Fertilizer Act adequately address the problem of potential ground water contamination that may result from poor application practices.

Local Health Departments

Under the Local Health Department Act (UCA 26-24-1 et seq.), local health departments are authorized to enforce State and local laws, regulations, and standards relating to public health and sanitation. Under this law, local health departments regulate septic tank installations.

Local Zoning Authority

The Utah Legislature has granted municipal and county governments zoning powers for the purpose of promoting the health, safety, morals, and the general welfare (UCA 10-9-1) of the community. Cities with populations over 100,000 have extraterritorial jurisdiction over their entire watershed for purposes of protecting their water supplies from pollution. Cities with populations of 60,000 to 100,000 have jurisdiction over the stream or water source for 15 miles above the point of withdrawal and 300 feet to either side of the stream (UCA 10-8-15). First and second class cities have the right to enact ordinances to prevent pollution or contamination of the streams or water courses from which they derive their water supply. Third class cities have jurisdiction for 10 miles upstream from the point of withdrawal for their public water supply.

Other Programs

Federal and State agencies are not the only groups involved in the study of ground water resources and the development of ground water management programs. Local government agencies and state universities have also contributed to the development of information on ground water resources and the problems with pollution of these resources.

Soil conservation districts, water conservancy districts, and local government units have been involved in investigative studies of ground water problems. Through cooperative agreements between federal, state, and local government agencies and funding under CWA Sections "208" and "205j" and other state and federal sources, ground water studies have been undertaken. For example, the Division of Flood Control and Water Quality of the Salt Lake County Department of Public Works has worked with the USGS, Salt Lake County Water Conservancy District, and the Utah Geological and Mineral Survey on a study to characterize the water quality and quantity in the shallow aquifer of the Salt Lake Valley.

Personnel of the Utah Water Research Laboratory at the Utah State University have published results of studies of ground water contamination problems in Utah. Funding for this work was derived from research funds provided by the Utah State Legislature.

WASHINGTON

Ground water quality is generally good in Washington State. However, available data indicate areas where water quality is degraded. Although the lack of good baseline data makes defining trends tenuous, certain land use practices occurring over unconfined glacial and alluvial aquifers are known to be adversely affecting water quality.

Examples of problem areas include: agricultural regions where domestic wells are tapping shallow aquifers resulting in elevated nitrate and chloride levels; the Lower Yakima Basin where rising water tables are causing on-site septic system failure; overwithdrawal in coastal areas, resulting in seawater intrusion; and leachate contamination of aquifers from operating and abandoned landfills statewide. Other problems include heavy metal and synthetic organic chemical contamination from military and industrial sites due to improper substance handling and disposal; synthetic organic contamination in Whatcom, Skagid, and Thurston counties from the use of soil fumigants; and sporadic contamination from petroleum product leaks and spills statewide.

Existing state resources are considered inadequate to quantify the extent of severity of ground water contamination, or to measure the impact on the environment, the economy, or public health.

Some ground water quantity problems could also be labeled as significant because of a declining water table. A major factor in Washington hydrology is the variability and complexity of the many aquifer systems, particularly the basalt system in east central Washington. These systems hold large quantities of water in storage, but are often very sensitive to large agricultural withdrawals, which sometimes adversely affect spring and stream flows as well as shallow domestic wells. With respect to deep wells, water levels could, without careful management, be drawn down to a point where it would no longer be economically feasible to pump. These conditions are becoming significant in some areas of the State.

The Washington Department of Ecology is responsible for both water quality and water quantity management. Program planning and management activities are carried out by the Water Quality and Water Resources Programs. Implementation activities are carried out by the Office of Operations and Enforcement. These activities are financed primarily with state general funds. However, additional sources of revenue include State Referendum 39 bond funds, the State Water Quality Account, state coastal protection funds, and federal funds under CWA Section 106 and SDWA Section 1443 (UIC funds).

The Department of Ecology has four regional offices which are staffed with water allocation and water quality professionals. Any site specific water resource management conflicts are normally handled at the regional office level. Policy conflicts, either within the Department or with other entities, are resolved through the Deputy Director of Programs, after consultation with the Deputy Director of Operations and Enforcement, the various regional offices and other involved entities.

Ground Water Allocation

Since 1945, the State has regulated ground water use. The ground water code is supplemental to the 1917 surface water code, and is subject to the same statutes governing appropriation and beneficial use. Ground water is defined as all waters beneath the land surface or beneath stream beds or other surface water bodies. The law is based on the premise of "first in time is first in right" and is also applicable to interrelated surface and ground waters.

Once an appropriation application is approved, the works are constructed, and the water is put to beneficial use, a certificate evidencing the perfected right is issued. Uses requiring less than 5,000 gallons per day are generally exempt from the requirement to obtain a permit. The 1945 Act also provided for the recording of ground water rights which vested prior to that time, and the issuance of a certificate with a priority as of the date of the earliest beneficial use of the water. The permit or certificate may also be amended to change the location of withdrawal without a loss of priority, provided that the new well taps the same ground water supply and will not enlarge the right and other existing rights will not be impaired. The Act prohibits the waste or pollution of ground water, and all artesian wells must be equipped with flow regulating devices. The State licenses well drillers, and minimum well construction standards have been established.

Within a ground water basin, the prior appropriator has the superior right over subsequent users from the same source to the extent of his beneficial use. Aquifers are generally administered so as to maintain a safe sustained yield, and the Director may designate areas and subareas which are independently administered to prevent overdraft. Withdrawals can then be adjusted to reflect the current supply and needs of all users. Conflicts between users may be resolved through administrative procedures and/or statutory adjudication proceedings. Further, the Director may appoint water supervisors to administer and distribute the water. Ground water rights are subject to forfeiture through non-use.

Ground water appropriation is generally limited to the capacity of the aquifer system, taking into account reasonable or feasible pumping lifts and/or reductions of artesian pressure. However, mining as such is not expressly prohibited. Administratively, state policy allows for planned depletions, defined as withdrawals that exceed net natural recharge, in one ground water management area, called the Odessa Subarea.

Washington statutes do not directly address protection of an appropriator's means of diversion as part of a water right. Some protection is provided through the above described policy for managing aquifers and through an administrative regulation. The State does protect prior appropriators who are fully utilizing an aquifer, but not those with pump settings close to the top of the aquifer. The object is to fully utilize aquifer reservoir capacity. Therefore, in granting a permit for the withdrawal of ground water, the Director of the Department of Ecology must take into account the capacity of the aquifer system, the impact on prior existing rights and the subarea management program for the vicinity, if one exists.

The State has also adopted an administrative regulation aimed at the protection of the future availability of water in upper aquifers of limited capacity in areas where there are multiple aquifer systems. The purpose is to manage such aquifers in a manner that protects them from depletions and reductions in water quality. The regulation states that the highest and best uses of the waters of these limited capacity aquifers may be for domestic, stockwatering, and other similar uses and for the preservation of spring and stream flows.

The State encourages the conjunctive use of surface and ground waters to the fullest extent possible, subject to the preservation of other existing rights. However, there is no active conjunctive use program. Some research performed as part of the Walla Walla River Basin Management Program concludes that conjunctive use is feasible and necessary for the full development of that basin's water resources.

With respect to artificial recharge, the State has no specific water storage program, but a process is provided by law for claiming ownership and use of artificially stored ground water in a designated ground water area, subarea, or zone. Owners of artificially stored waters use this process in lieu of the normal water right appropriation process. The State has accepted two declarations of artificially stored ground water filed by entities claiming ownership of ground waters recharged artificially through the importation of surface water for irrigation.

In 1985 the State amended the ground water code with the addition of provisions establishing a process for comprehensive and coordinated ground water planning and management. Administrative guidelines, criteria, and procedures have been adopted for designating ground water management areas and for developing ground water management programs that address the protection and preservation of both ground water quality and quantity. The programs are developed by a lead agency in cooperation with an advisory committee consisting of ground water users, local and state agencies, public interest groups, and others. The programs address issues such as land and water use, hydrogeology, jurisdictional and management responsibilities of affected agencies, existing ground water quantity and quality, goals and objectives including strategies for protection of present and future uses, and an implementation plan. Following adoption of the program, affected local and state agencies must adopt implementing policies and regulations. The enactment of state legislation in 1986 establishing a water quality account for financing water pollution control facilities and activities has assured funding assistance for the development and implementation of these ground water management programs. State funding assistance in general cannot exceed 50% of the annual costs of such programs. Efforts are now underway in many areas of the State to establish ground water management programs.

Ground Water Quality

Primary authority for addressing ground water contamination comes from the Washington Water Pollution Control Act of 1945, and the Water Resources Act of 1971, and, to a lesser degree, solid and hazardous waste laws and regulations. Resources available to address clean up of ground water contamination problems are limited. Therefore, protection of ground water quality is being given increasing attention. To ensure an effective use of limited resources, the State is developing a ground water quality management strategy that will better coordinate the various ground water quality related efforts.- These include increased monitoring, assessment of the impacts of storm water disposal on ground water quality, regulation of on-site sewage disposal systems, responses to spill emergencies, and a variety of ground water related activities under RCRA, CWA, and SDWA.

The State is developing ground water quality standards that will consist of a classification system to designate the degree of environmental protection for aquifers. Classification will be based on both current and projected uses, and aquifer sensitivity. The standards will also include numeric water quality criteria. Existing law requires all known, available, and reasonable technology be applied to discharges to prevent ground water contamination.

The State of Washington has primacy for the federal UIC program. The state prohibits the disposal of waste through injection wells; no class I through IV wells are allowed under current laws. Injection wells in Washington are primarily used for the disposal of stormwater. These Class V wells are being inventoried, and an assessment of the impact on ground water quality is being initiated. It is estimated that Washington has approximately 15,000 Class V UIC wells; far more than in any other state.

The State has not adopted any land use controls to protect ground water as this is viewed as a responsibility of local government. Spokane County has exercised some land use controls over a SDWA-designated sole source aquifer through adoption and implementation of a CWA Section 208 plan. Under legislation enacted in 1984, local governments are required to include the protection of the quality and quantity of ground water used for public water supplies as an element of their comprehensive plans. Local governments are now updating their plans to include this element. A 1985 act allows local governments to create aquifer protection districts. Within the districts, fees may be imposed upon ground water withdrawals and on-site sewage systems. The fees may be used to fund comprehensive plans to protect, preserve and rehabilitate ground water, including conservation or facilities. Spokane county has established an aquifer protection district over its sole source aquifers. It is likely that the fees will also be used to match state assistance funds granted for the development and implementation of the ground water management programs discussed above under "ground water allocation."

WYOMING

Ground water quality problems in Wyoming may be viewed as significant because of the potential impact of industrial and mineral development, as well as population pressures. So far, most impacts have not exceeded established quality criteria/standards, but in some instances corrective action has been required.

Several state agencies are authorized to address specific ground water problems. Water quality is primarily the responsibility of the Department of Environmental Quality, which includes the Water Quality Division, Land Quality Division, and Solid Waste Administration. Each addresses specific problems related to ground water protection. The State Engineer's Office is responsible for ground water allocation. In addition, the Oil and Gas Conservation Commission is also directly involved in some matters concerning ground water utilization. To date, the State has not experienced serious conflicts between ground water quality regulation and allocation.

Ground water related activities are generally financed through legislative appropriations from the general fund, with some funding from federal grants.

Ground Water Allocation

Wyoming's basic ground water law was enacted in 1947, and has been amended several times. Ground water rights acquired prior to enactment are considered vested if the owner had completed development and put the water to beneficial use, provided a statement to that effect was filed with the State Engineer by 1957. The priority of ground water appropriations completed prior to April 1, 1947 dates from the filing of the registration. Rights were acquired after April 1, 1947, by completing development and registering the well with the State Engineer. Beginning in 1969, the law was amended to prohibit construction of any well without first obtaining a permit from the State Engineer. Stock and domestic wells, which had previously been exempted, were provided an opportunity to register and retain the date of completion as a priority date. Ground water rights are subject to the same preferences as provided for surface water, except that stock and domestic use have a preferred right regardless of their priority dates.

Currently, applications to appropriate ground water will be granted provided: (1) there is a beneficial use; (2) the use is not in a control area; (3) the means of diversion are adequate; and, (4) the filing is in the public interest as determined by the State Engineer. In control areas, notice must be published, objections may be filed, and a hearing must be held. The State Engineer may approve an application if he finds that there is unappropriated water, the means of diversion are adequate, the well is properly spaced, and the proposed use will not be detrimental to the public interest. The State Engineer may condition any permit to insure the latter.

Permits to appropriate ground water include time limits for the commencement and completion of construction, and the application to put the water to beneficial use. Upon completion of a project, proof of appropriation is submitted, the facility is field inspected, and a certificate is issued if the terms of the permit have been satisfied. It is a misdemeanor to drill a well without obtaining a ground water permit, and permits may be cancelled, after notice and hearing, for violations of any provisions of the permit, of the Act, or of any order issued by the State Engineer pursuant to the Act. The State does not license well drillers, but there are minimum water well construction standards. Further, a report is required on abandonment of works.

The State Engineer is authorized, under the oversight of the Board of Control, to: (1) prescribe rules and regulation necessary to administer the Ground Water Act; (2) require reports from well drillers and water users; (3) establish standards for well construction; (4) prevent waste or pollution of ground water; (5) initiate action to secure compliance with provisions of the law; and, (6) in control areas, make well spacing regulations and determine the boundaries of districts overlying the various aquifers.

A ground water control area may be designated where: (1) withdrawals are approaching recharge; (2) water levels have declined excessively; (3) there are actual or potential conflicts between users; (4) waste is occurring or may occur; or, (5) specific conditions require regulation in the public interest. The State Engineer reports such conditions to the Board of Control which, after hearing and upon sufficient evidence, may designate a control area. Subsequently, a district advisory board is elected to assist in administration of the basin. Once boundaries of the area are determined, the Board of Control adjudicates the various rights and issues certificates defining individual rights.

Upon petition of the users, or the State Engineer's own initiative, and after hearings, a basin's supply may be determined to be inadequate for existing needs and may be closed to further appropriation. The State Engineer may also determine the total permissible withdrawal and apportion the water according to the priority of rights. He may also require rotation of use in a control area if he determines that the cessation of use by junior appropriators will not result in proportionate benefits to senior appropriators. The law also allows appropriators from a control area to agree on a method of withdrawal. In accordance with the above procedures, ground water mining can be prohibited.

Also as described above, the State provides protection to prior ground water users if their means of diversion is "adequate." Wyoming law provides as an express condition of each permit that an appropriator's right does not include the maintenance of a specific water level or artesian pressure greater than that required for maximum beneficial use of the source of supply. However, if adequacy can be determined, subsequent users can be required to cease withdrawals or compensate prior appropriators for deepening wells and additional pumping costs. With respect to wells used solely for domestic and stock watering purposes, upon complaint the State Engineer may order an interfering well to cease or reduce withdrawals unless the water is replaced, whether or not the wells are in a control area.

An appropriator may change the location of a well without a loss in priority. If the right has been adjudicated, approval must be secured from the Board of Control, otherwise the change must be approved by the State Engineer. Ground water rights may be adjudicated under the same procedures applicable to surface waters. Further, they may similarly be declared abandoned and forfeit.

The State does not have a specific conjunctive use program, but the law recognizes that often surface and ground water supplies are interconnected and provides for their unified administration. The State does not have an artificial recharge program, nor does it appropriate artificially stored ground waters.

Ground Water Quality

The Wyoming Environmental Quality Act gives the Department of Environmental Quality broad authority to prevent, reduce, and eliminate pollution, and preserve and enhance the air, water (including ground water) and land resources of Wyoming. Specifically, the Department has developed ground water rules and regulations and quality standards. Protection is provided from direct subsurface discharge of waste or migrating pollution, well or exploration hole drilling, potential polluting surface facilities, and mining operations.

Ground waters of the State are classified by regulation as domestic (I); agriculture (II); livestock (III); fish and aquatic life (Special A); industry (IV A) less than 10,000 mg/l total dissolved solids (TDS), and (IV B) TDS greater than 10,000 mg/l; hydrocarbon, mineral or geothermal (V); and those unusable or unsuitable for use (VI).

Specific numeric standards have been established for Classes I, II, III, and Special (A). A discharge into aquifers in these classifications may not violate these standards (see tables on following pages) at any place or places of withdrawal or natural discharge to the surface generally. The quality requirements for industrial water supplies (IV) cover a wide range depending upon industrial application. Discharges into any of the heretofore described classifications may not impair the quality of ambient ground waters of the same classification or contribute to, cause, allow, or permit any toxic, hazardous, or deleterious affect on natural biota.

With respect to Class V ground waters, discharges shall not result in degradation or pollution or waste of other water resources. Class V mineral ground water must at a minimum be returned to a condition and quality consistent with the pre-discharge classifications of the water. With respect to Class VI unsuitable or unusable ground water, such classifications are made: (1) due to excessive concentrations of TDS; or (2) where the water is already so contaminated that it would be economically or technologically impractical to make use of the water; or, (3) where the water is located in such a way, including depth, so as to make use impractical.

The classification of ground waters is based upon the established standards and its suitability for actual and intended uses. Acceptable risk is not addressed by statute. Economics is one of several factors which the Administrator is to consider in recommending any water quality standards, rules, regulations, or permits.

Wyoming has assumed primary responsibility for administering the federal UIC program. The main type of underground injection wells used in the State are those associated with the disposal of produced water and secondary petroleum recovery operations (Class II). Others include in situ mining projects (Class III and Class V), several industrial waste disposal projects (Class I), and miscellaneous injection wells (Class V). The State can prohibit waste disposal by injection if it would endanger fresh water supplies.

The State has delegated authority for land use planning to the counties, and counties have developed individual land use plans of a general nature. The State has not adopted specific land use controls to directly protect ground water. Ground water quality is directly and indirectly protected by Department of Environmental Quality rules and regulations (as previously described) and other state statutes and regulations.

The State has not yet assumed primacy for EPA's RCRA program. Therefore the disposal of hazardous waste is regulated by the EPA. However, the Solid Waste Management Section of the Department of Environmental Quality has implemented regulations which include ground water monitoring and protection.

Problems regarding leaking underground storage tanks could result in the consideration of proposed legislation and/or regulations in the near future.

TABLE II

UNDERGROUND WATER CLASS Use Suitability Constituent or Parameter	Special (A) Fish/Aquatic Life Concentration *
Aluminum (Al)	0.1
Ammonia (NH_3)	0.02[1]
Arsenic (As)	0.05
Barium (Ba)	5.0
Beryllium (Be)	0.011-1.1[3]
Boron (B)	---
Cadmium (Cd)	0.0004-0.015[3]
Chloride (Cl)	---
Chromium (Cr)	0.05
Cobalt (Co)	---
Copper (Cu)	0.01-0.04[3]
Cyanide (CN)	0.005
Fluoride (F)	---
Hydrogen Sulfide (H_2S)	0.002[2]
Iron (Fe)	0.5
Lead (Pb)	0.004-0.15[3]
Lithium (Li)	---
Manganese (Mn)	1.0
Mercury (Hg)	0.00005
Nickel (Ni)	0.05-0.4[3]
Nitrate (NO_3-N)	---
Nitrite (NO_2-N)	---
(NO_3+NO_2)-N	---
Oil & Grease	Virtually free
Phenol	0.001
Selenium (Se)	0.05
Silver (Ag)	0.0001-0.00025[3]
Sulfate (SO_4)	---
Total Dissolved Solids (TDS)	500.0[4]-1000.0[5]-2000.0[6]
Uranium (U)	0.03-1.4[3]
Vanadium (V)	---
Zinc (Zn)	0.05-0.6[3]
pH	6.5s.u.-9.0s.u.
Combined Total Radium 226 and Radium 228[9]	5pCi/l
Total Strontium 90	8pCi/l
Gross alpha particle radioactivity (including Radium 226 but excluding Radon and Uranium)[9]	15pCi/l

*mg/l, unless otherwise indicated

TABLE II

UNDERGROUND WATER CLASS Use Suitability Constituent or Parameter	I Domestic Concentration*	II Agriculture Concent.*	III Livestock Concent.*
Aluminum (Al)	---	5.0	5.0
Ammonia (NH)	0.5[3]	---	---
Arsenic (As)	0.05	0.1	0.2
Barium (Ba)	1.0	---	---
Beryllium (Be)	---	0.1	---
Boron (B)	0.75	0.75	5.0
Cadmium (Cd)	0.01	0.01	0.05
Chloride (Cl)	250.0	100.0	2000.0
Chromium (Cr)	0.05	0.1	0.05
Cobalt (Co)	---	0.05	1.0
Copper (Cu)	1.0	0.2	0.5
Cyanide (CN)	0.2	---	---
Fluoride (F)	1.4-2.4[7]	---	---
Hydrogen Sulfide (H_2S)	0.05	---	---
Iron (Fe)	0.3	5.0	---
Lead (Pb)	0.05	5.0	0.1
Lithium (Li)	---	2.5	---
Manganese (Mn)	0.05	0.2	---
Mercury (Hg)	0.002	---	0.00005
Nickel (Ni)	---	0.2	---
Nitrate (NO_3-N)	10.0	---	---
Nitrite (NO_2-N)	1.0	---	10.0
(NO_3+NO_2)-N	---	---	100.0
Oil & Grease	Virtually Free	10.0	10.0
Phenol	0.001	---	---
Selenium (Se)	0.01	0.02	0.05
Silver (Ag)	0.05	---	---
Sulfate (SO_4)	250.0	200.0	3000.0
Total Dissolved Solids (TDS)	500.0	2000.0	5000.0
Uranium (U)	5.0	5.0	5.0
Vanadium (V)	---	0.1	0.1
Zinc (Zn)	5.0	2.0	25.0
pH	6.5-9.0s.u.	4.5-9.0s.u.	6.5-8.5s.u.
SAR	---	8	---
RSC	---	1.25 meq/l	---
Combined Total Radium 226 and Radium 228[3]	5pCi/l	5pCi/l	5pCi/l
Total Strontium 90	8pCi/l	8pCi/l	8pCi/l
Gross alpha particle radioactivity (including Radium 226 but excluding Radon and Uranium)[3]	15pCi/l	15pCi/l	15pCi/l

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*mg/l, unless otherwise indicated

Appendix A

State Agencies Primarily Responsible for Ground Water Allocation and Quality Management

STATE	ALLOCATION	QUALITY
Alaska	Div. of Land & Water Management Department of Natural Resources Tom Hawkins, Director P. O. Box 7-005 Anchorage, AK 99510 (907) 561-2020	Div. of Environmental Quality Dept. of Env. Conservation Keith Kelton, Director P.O. Box O Juneau, AK 99811 (907) 465-2640
Arizona	Dept. of Water Resources Kathleen Ferris, Director 99 E. Virginia Phoenix, AZ 85004 (602) 255-1553	Dept. of Health Services Office of Waste Water Quality Ronald L. Miller, Manager 2005 North Central Phoenix, AZ 85004 (602) 257-2304
California	State Water Res. Control Board Walter G. Pettit Deputy Executive Director P.O. Box 100 Sacramento, CA 95801 (916) 445-3085	Same as Allocation
Colorado	Dept. of Natural Resources Div. of Water Resources Jeris Danielson, State Engineer 1313 Sherman St. Denver, CO 80203 (303) 866-3581	Department of Health Water Quality Control Division Gary Broetzman, Director 4210 E. 11th Avenue, Rm. 320 Denver, CO 80220 (303) 320-8333
Idaho	Dept. of Water Resources A. Kenneth Dunn, Director Statehouse Boise, ID 83720 (208) 334-2190	Dept. of Health & Welfare Division of Environment Lee Stokes, Administrator Statehouse Boise, ID 83720 (208) 334-5839

Montana	Dept. of Natural Resources & Conservation Water Rights Bureau Larry Holman, Chief Capitol Station Helena, MT 59620 (406) 444-6610	Dept. of Health & Environmental Sciences Water Quality Bureau Steven L. Pilcher, Chief Capitol Station Helena, MT (406) 444-2406
Nevada	Dept. of Conservation & Natural Resources Division of Water Resources Pete Morros, State Engineer 201 South Fall Street Capitol Complex Carson City, NV 89710 (702) 885-4380	Dept. of Conservation & Natural Resources Division of Water Resources Wendell McCurry, Water Quality Officer 201 South Fall Street Capitol Complex Carson City, NV 89710 (702) 885-4670
New Mexico	State Engineer Office S. E. Reynolds, State Engineer Bataan Memorial Building State Capitol Complex Santa Fe, NM 87503 (505) 827-6175	New Mexico Envir. Improve. Div. Gr. Water/Hazardous Waste Bureau Ernie Rebuck, Bureau Chief P.O. Box 968 Santa Fe, NM 87504-0968 (505) 827-2918
North Dakota	State Engineer Office Vernon Fahy 900 East Boulevard Bismarck, ND 58505 (701) 224-4940	North Dakota State Department of Health Environmental Health Section Gene Christianson, Chief 1200 Missouri Avenue, Box 5520 Bismarck, ND 58502-5520 (701) 224-2374
Oregon	Water Resources Dept. Willam H. Young, Director 3850 Portland Road N.E. Salem, OR 97310 (503) 378-2982	Dept. of Environmental Quality Water Quality Division Richard Nichols, Admin. P. O. Box 1760 Portland, OR 97207 (503) 229-5324
South Dakota	Water Rights Division John Hatch, Chief Engineer Foss Building Pierre, SD 57501 (605) 773-3352)	James D. Nelson, Director Div. of Environmental Quality South Dakota Department of Water and Natural Resources Joe Foss Building Pierre, SD 57501 (605) 773-3351

Texas

Texas Water Commission
Larry R. Soward, Exec. Dir.
P. O. Box 13087
Capitol Station
Austin, TX 78711
(512) 463-7791

Texas Dept. of Health
Division of Water Hygiene
Thomas D. Tiner, Director
1100 W. 49th Street
Austin, TX 78756
(512) 458-7533

Utah

Dept. of Natural Resources
Division of Water Resources
Larry Anderson, Director
1636 West North Temple
Salt Lake City, UT 84116
(801) 533-5401

Dept. of Health
Division of Environmental Health
Bur. of Water Pollution Control
Calvin Sudweeks, Director
P.O. Box 16690
Salt Lake City, UT 84116
(801) 538-6146

Washington

Dept. of Ecology
Water Resources
George Krill, Acting Program Manager
Mail Stop PV-11
Olympia, WA 98504
(206) 459-6053

Dept. of Ecology
Water Quality
Carol Jolly, Program Manager
Mail Stop PV-11
Olympia, WA 98504
(206) 459-6143

Dept. of Ecology
Operations and Enforcement
Marc Horton, Deputy Director
Mail Stop PV-11
Olympia, WA 98504
(206) 459-6053

Wyoming

Wyoming State Engineer
George Christopulos
Herschler Building
Cheyenne, WY 82002
(307) 777-7354

Dept. of Environmental Quality
Randolf Wood, Director
Herschler Building
Cheyenne, WY 82002
(307) 777-7938

APPENDIX B

STATE GROUND WATER MANAGEMENT QUESTIONNAIRE

I. State Ground Water Programs

1. How significant are ground water problems in your state?

2. What authorities and resources are available to the state to address specific ground water contamination problems? (Please supply any statutes, regulations, orders, recent studies, etc., or relevant parts thereof, which would be useful.)

3. What emergency response authority and capability does the state have?

4. Which state agencies, divisions, or offices are responsible for ground water quality and quantity management? (Please provide the names, titles, addresses and phone numbers of those individuals primarily responsible for ground water quality and quantity management in the state.) What initiatives are being undertaken to better address ground water management in the state?

5. How are state programs financed?

6. Has the state adopted a ground water classification procedure, and have (or can) aquifers be designated for waste disposal?

7. Has the state adopted any land use controls to protect ground water (critical recharge zones, etc.).

II. State Ground Water Standards

1. What existing standards and policies does the state use for ground water protection?

2. What has been the role of the state legislature and of the executive agencies in establishing such standards and policies? (Any relevant statutes, regulations or policy statements which might be provided would be useful.)

3. To what extent do state standards address the issue of acceptable risk?

4. What role do economic factors play in establishing standards?

5. Has the state developed siting standards for the land disposal of hazardous wastes in order to protect ground water quality?

III. Underground Injection Control

1. What are the main types of underground injection wells used in the state?

2. What is the scope of the use of injection wells for subsurface waste disposal, and what is the scope of related drinking water supply contamination problems?

3. Has the state been delegated the responsibility for the federal underground injection control program under the Safe Drinking Water Act? If not, what progress has been made toward attaining primacy and what problems have been encountered.

4. Does (or can) the state prohibit the disposal of waste through deep injection wells?

IV. State Ground Water Allocation Systems

1. Does the state have ground water appropriation codes or other regulations?

2. Does (or can) the state prohibit the mining of ground water, and how is mining defined?

3. How does the state address ground water quality regulation and ground water allocation conflicts?

4. How does the state address the conjunctive use of ground and surface waters? Does the state have an active conjunctive use program?

5. Does the state have an artificial recharge program for aquifer storage? If so, how does the state appropriate artificially stored ground waters?

6. Does the state license well drillers, and does the state have uniform well construction standards?

7. Does the state provide protection to prior ground water users in their means of diversion against subsequent users? How and to what extent? (For example, can subsequent users be enjoined from lowering the water table or be required to compensate early users for any additional costs which they may thereby be caused to incur?)